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THE BIRDS OF BANKS ISLAND

BY
T. H. Manning
E. O. Höhn
A. H. Macpherson

1956

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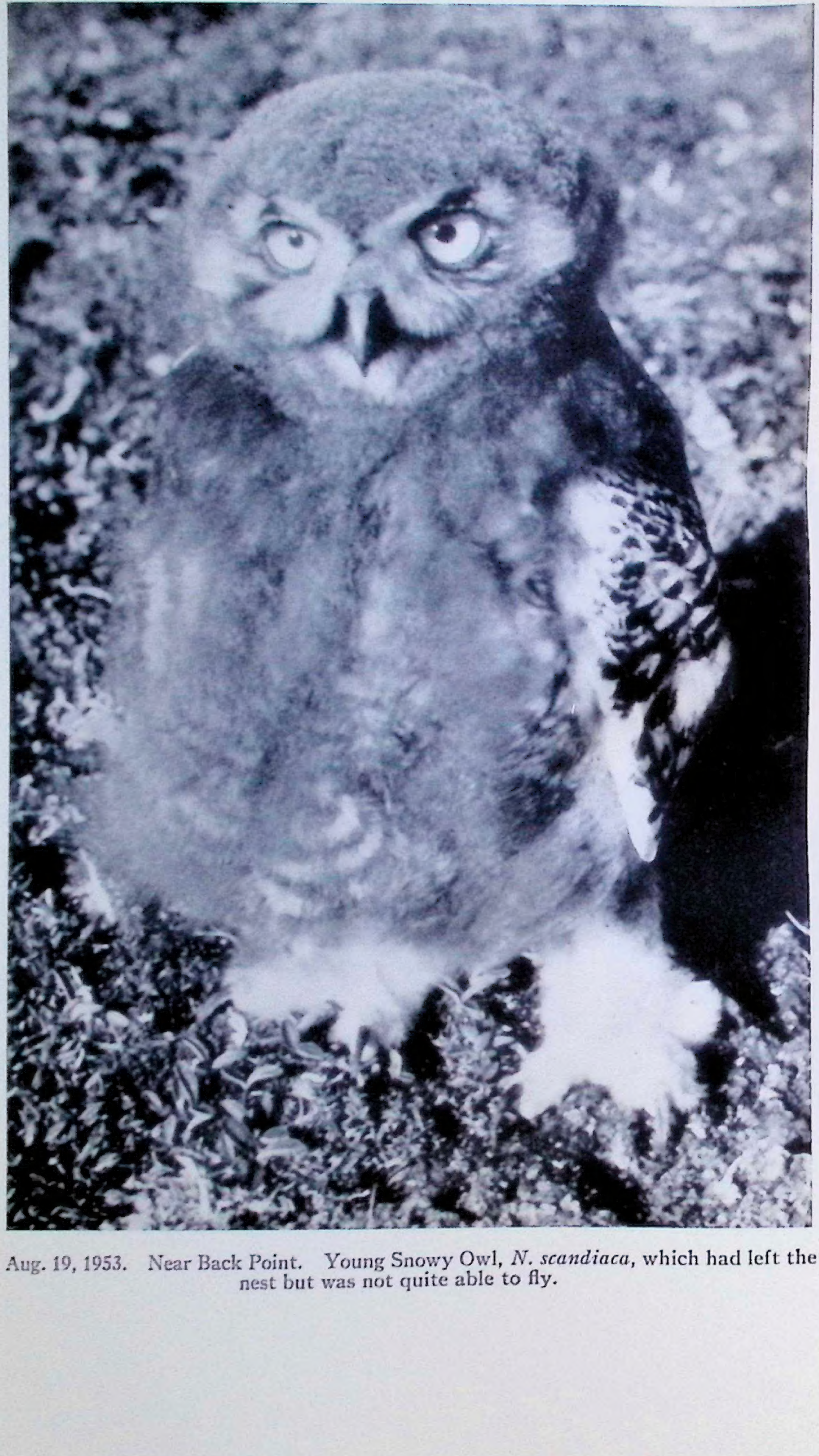

Aug. 19, 1953. Near Back Point. Young Snowy Owl, *N. scandiaca*, which had left the nest but was not quite able to fly.

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THE BIRDS OF BANKS ISLAND

INTRODUCTION[1]

This paper is concerned principally with observations on the birds of Banks Island made in 1952 by Manning and Macpherson while engaged in reconnaissance work for the Defence Research Board, and in 1953 by Manning, who was again working for the Defence Research Board, and by Höhn, who visited the island expressly to investigate the bird life (*See* Field Work, p. 5). Previous records for the island (*See* p. 17) have been included, as well as sufficient extralimital information to indicate the position of Banks Island within the range of each species. This is often of particular interest, since the northern part of the island is farther north than any of the other islands south of the M'Clure Strait – Lancaster Sound water barrier, which effectively limits the northward distribution of several species. The southern part of Banks Island, or at least the Cape Kellett and Sachs Harbour region, lies a little farther north than any part of the Alaskan mainland, and distinctly north of any part of the western Canadian arctic mainland. Vagrants are therefore often northern records for the nearctic, or at least for all parts of it except Greenland.

Sixty-two species have been recorded on Banks Island. Fifty-three of these are considered definite records, nine hypothetical. All of the latter and 17 of the former may be considered vagrants, although a few may nest occasionally.

SPECIMENS, TAXONOMY, AND MEASUREMENTS[2]

Three hundred and ten bird skins were collected from the western Canadian Arctic, chiefly on Banks Island, by Manning and Macpherson in 1952, and 180 by Manning and 10 by Capt. I. M. Sparrow in 1953. These were presented to the National Museum by the Defence Research Board. Höhn's 1953 collection totalled 78 skins. About half were bought by the National Museum, and half by the University of Alberta. All were used in the preparation of this report. Since the National Museum already had a large collection of arctic birds, it appeared advisable to take the opportunity offered by the above additions to make a study of most of the relevant material, and particularly to compare series from the western Canadian Arctic with those from one or more eastern arctic populations. Apart from our Banks Island specimens, the western arctic material consists

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[1] We are very much indebted to Mrs. T. H. Manning for doing many of the calculations of mean and standard errors and for checking the remainder, as well as for much of the typing. We also wish to thank Dr. F. J. Alcock, Chief Curator, and Mr. W. E. Godfrey for access to the collections and for the facilities of the National Museum. Mr. Godfrey and Mr. Graham Cooch have kindly read through the manuscript but are in no way responsible for any errors that may remain. Mr. John Crosby kindly assisted with the Figures. The base map was provided by the Department of Mines and Technical Surveys.

[2] Manning is entirely responsible for the measurements and taxonomic treatment. This work was done under grants from the National Museum and from the Northern Research Coordination Centre of the Department of Northern Affairs and National Resources.

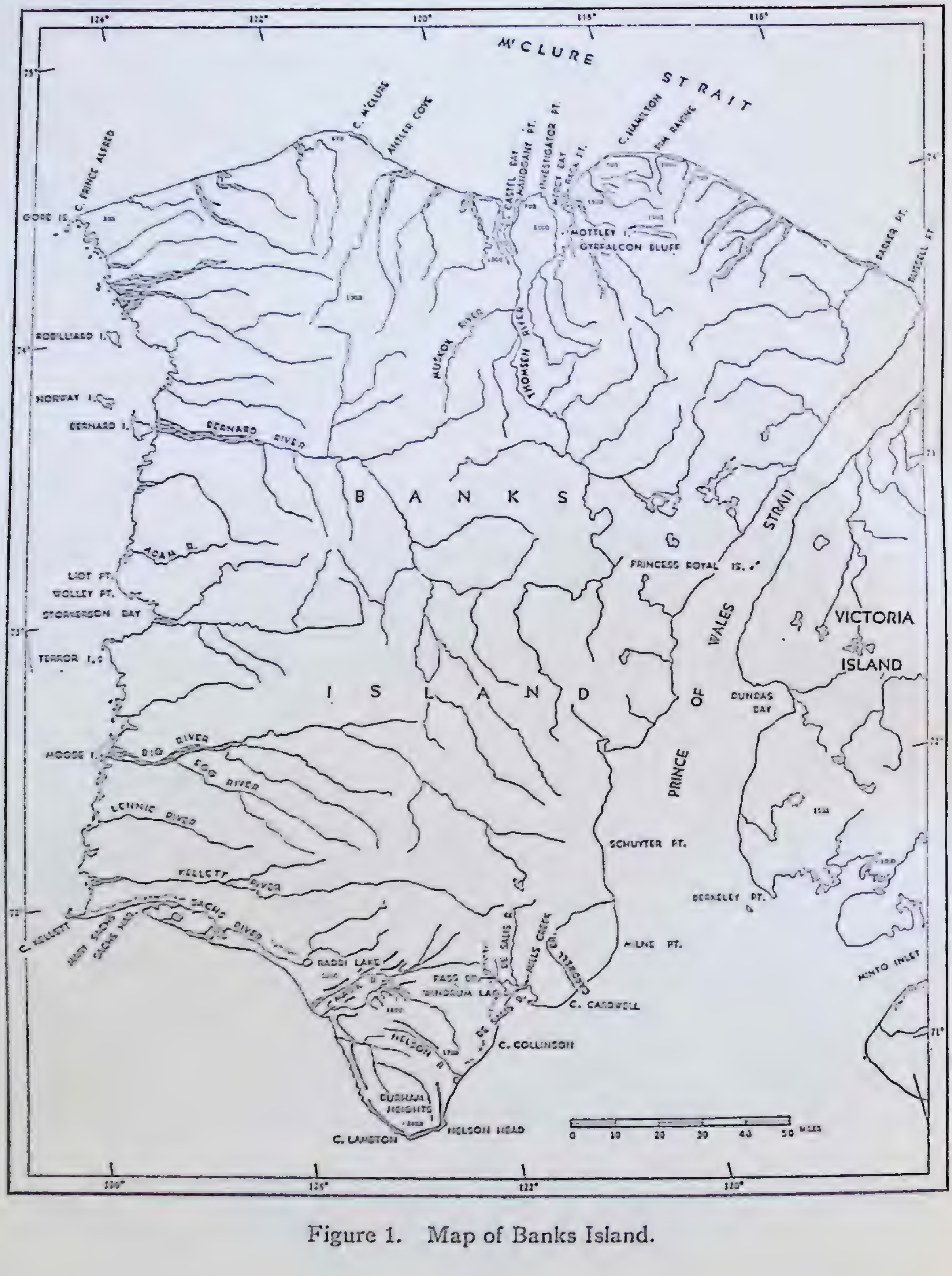

Figure 1. Map of Banks Island.

chiefly of birds obtained by members of the Canadian Arctic Expedition 1913–18. These include many specimens from the mainland coast between Point Barrow and Bathurst Inlet taken by R. M. Anderson, and a lesser number taken on Banks and Victoria islands by G. H. Wilkins, P. Bernard, and D. Jenness. The Canadian Arctic Expedition's bird collections are listed by Anderson (1915, 1917) but have never been studied as a unit. By far the largest eastern arctic collection is that accumulated by Soper (1928, 1946) between 1924 and 1931 in south, principally southwest, Baffin Island. For some species there are also good series from Churchill taken by A. C. Lloyd and P. A. Taverner in 1930 and 1931 (Taverner and Sutton, 1934), from James Bay by Manning, Macpherson, and Coates between 1947 and 1950 (Manning, 1952; Manning and Coates, 1952; Manning and Macpherson, 1952). From the far north (Queen Elizabeth Islands), the main collections are those obtained by MacDonald (1954) at Mould Bay, Prince Patrick Island[1] in 1949 and 1952, and at Alert, north Ellesmere Island in 1951 (MacDonald, 1953), and by J. S. Tener at Slidre Fjord, central west Ellesmere Island, also in 1951 (Godfrey, 1953).

In spite of these collections, which are supplemented by many smaller ones, there are but few species for which there are adequate series from more than one or two areas, and many huge gaps from which specimens, even of common species, are entirely lacking: in fact, there are still areas where virtually nothing is known of the bird life. The most obvious gaps within Canadian territory are: 1) the central arctic region, both the mainland and islands, from the longitude of Coronation Gulf eastward to Hudson Bay, and, in so far as the National Museum is concerned, all the west side of Hudson Bay;[2] 2) north and east Baffin Island; and 3) the Labrador Peninsula and particularly the Labrador coast. Even more serious is the almost complete absence of collections in the National Museum from Greenland, western Alaska, and, for some species, the palearctic. For the present work, however, it has not been practicable to borrow supplementary material.[3] This must be left for future more detailed studies of individual species or groups.

The geographical grouping in the tables of measurements is variable, as it depends on the number of specimens available, the most likely natural divisions, and the actual geographical variation, or lack of variation, shown by the measurements. The possibility of the use of these measurements for comparison of future collections, or of collections now in other museums, has also been kept in mind. Standard deviations, standard errors of the mean, and coefficients of variation with their standard errors have been calculated for all groups of ten or more specimens, and occasionally for fewer when it seemed desirable. The standard deviation has been calculated from the approximate formula $\sqrt{\frac{\Sigma(fd^2)}{N}}$. The neglect of Bessel's correction in the calculation is of little importance for the larger samples, and for the critical comparison of means of smaller groups may be overcome, as in this paper, by the use of Student's t or by multiplying the standard deviation by $\sqrt{\frac{N}{N-1}}$. Bias, introduced into the standard error of the mean, the coefficient of variation and its standard error by deriving them from the standard deviation as here calculated may also, if desired, be eliminated by multiplying them by $\sqrt{\frac{N}{N-1}}$.

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[1] A collection of 59 birds taken there by Macpherson in 1954 arrived in time for the inclusion of only a few specimens in this study.

[2] We are indebted to Mr. Graham Cooch for permission to use his 1952 and 1953 Southampton Island collection.

[3] During a brief day's visit to the American Museum of Natural History, Manning, through the courtesy of Mr. Dean Amadon, was able to measure a small number of specimens which have been included here and noted under the species concerned.

Measurements up to 120 mm. were taken with vernier calipers, usually to .1 mm. However, when over 100 mm., the extremes are given to only 1 mm. This accounts for occasional apparent inconsistencies in the mean of two measurements between 100 and 120 mm. Above 120 mm., a bar compass was used as calipers in conjunction with a millimetre rule. *Wing measurements:* In small birds, wing chords were usually measured; in larger species, the variation in make-up or accidental bending of the tip of the primaries made it necessary to straighten the wing in order to obtain a standard measurement. This was done by straightening the primaries as much as possible with the left hand but without increasing the measurement by pulling them outward. It is, in fact, the measurement of the wing that would be obtained in the position shown by Witherby *et al.* (1948, Vol. I, p. xxxiv) but without quite the flattening obtained by pressing it onto a ruler. The advantage of the straightened wing measurement over that taken by ruler is partly the ease with which it can be accomplished and partly the greater standardization which may be obtained. Brooks (1935) has referred to the personal equation that enters into the measurement of flattened wings. It is certainly greater than the deceptively simple illustration of Witherby *et al.* (1948) would indicate, because in normal study skins it is so often impossible to place the ruler as there shown: either it must be swung inward toward the tail, or the primaries must be bent outward, thus counteracting the bend at the 'hand' and increasing the measurement. That the primaries have not been so bent in the illustration referred to is a clear indication that the largest possible measurement, which Witherby *et al.* (1948, Vol. I, p. xxxiv) say they used, is not in fact being illustrated. In some species, the 'stretched wing' and flattened wing measurements appear nearly comparable; in others, particularly the plovers and sandpipers, the stretched wing length is thought to lie about midway between that of the flattened wing and the wing chord. In long-winged birds, it is relatively easy to straighten the wing so as to obtain the maximum possible measurement. The jaegers, gulls, and terns are birds of this type. It so happened that they were measured before all the complications of variation in techniques for flattened wing measurements were realized. Their wings were therefore straightened with the left hand, and the primaries bent outward as far as necessary to obtain a maximum measurement. To distinguish this measurement from that used with the other species and called 'straightened wing', it has been called 'flattened wing' because from actual experiment with a number of specimens of different-sized gulls it was found to agree very closely with a maximum measurement taken along a ruler. Dwight (1925, p. 124) says the flattened wing averages 2.3 per cent longer than the wing chord in large gulls, and 1.9 per cent in the small species, a statement which may be considered true of the 'flattened wing' measurement as obtained by the above method. Measurements were taken on the left wing unless it was damaged. *Bill measurements:* Exposed culmen measurements are chords, one tip of the calipers being placed at the edge of the feathering, the other on the tip of the bill. More often, however, the bill has been measured from the nostril, the anterior or posterior edge being used, as stated, according to the relative clearness with which they are marked in different species. In the Lapland Longspur and Snow Bunting, the anterior border of the nasal fossa is well marked and has been used as the posterior limit of the bill measurement. *Tarsus measurements:* These are from the anterior distal extremity of the tarsometatarsus to the posterior mid point of the joint between that bone and the tibiotarsus, and therefore comparable to the measurements recommended by Baldwin *et al.* (1931). Measurements were taken on the left leg unless it was damaged.

FIELD WORK

During the Defence Research Board's hydrographic and oceanographic expedition in 1951 (Hattersley-Smith, 1952), Manning and Macpherson made hurried landings on Banks Island at the following places: Liot (actually Wolley) Point, August 26, three-quarters of an hour (Macpherson only); Cape Kellett spit, August 26-27 (no bird observations); Sachs Harbour, August 27, one hour; De Salis Bay, September 2, 3 hours. In 1952 an R.C.A.F. Dakota landed them at De Salis Bay on May 10. Except for a walk to Sachs Harbour between June 17 and 29, they remained in the vicinity of De Salis Bay, and covered the coast, chiefly on foot, from north of Milne Point to Cape Collinson. They walked up to 10 miles inland until July 20, when ice conditions first permitted a move to the valley of the Nelson River. From there, travelling whenever weather and ice conditions permitted, they followed the south, west, and north coasts in a 22-foot freight canoe with a 5-h.p. outboard motor. The stops where bird observations were made are listed below under "Collecting and Recording Stations" (p. 11). Mahogany Point was reached on August 19, and the attempt to continue along the coast was abandoned on August 29. On that day they went 12 miles up the Thomsen River before it became too shallow for the canoe, and on September 2, pulling a sledge, they started for Sachs Harbour. They arrived on September 15, and left for the mainland by Peterhead boat on September 22. (For more detailed accounts see Manning (1953) and Macpherson (1953)).

In 1953 Manning (1954) returned to Banks Island with Capt. I. M. Sparrow, R.E., to complete the coastal investigations for the Defence Research Board. On May 10, they landed at Sachs Harbour together with Höhn, who stayed there with the Eskimos to do ornithological work until July 29, when he returned with them by boat to the mainland (Höhn, 1955). On May 12, Sparrow and two Eskimos left by dog-team for Castel Bay, and two days later Manning moved to Cape Kellett, his base, until June 24 when he returned to Sachs Harbour. On May 31, Höhn travelled with several Eskimos by dog-team to Egg River. He returned to Sachs Harbour on June 2. On June 28, Manning and Sparrow left to walk to Thomsen River. Höhn accompanied them to Big River, whence he returned to Sachs Harbour. Owing to the amount of soft snow still left on the land, the depth of the rivers, and the numerous small streams filled or bordered with slush, it soon proved impossible to follow the intended route to Egg River and then directly overland to the junction of Thomsen and Muskox rivers. They therefore turned west down the Lennie River and followed the coast north to Bernard River, going out on the sea-ice occasionally to avoid the larger streams. From the north side of Bernard River a direct route overland was taken, and the canoe and cache, which had been left 12 miles up Thomsen River in 1952, were reached on July 15. On July 18, Manning and Sparrow went by canoe to Mahogany Point, and from there moved east along the coast whenever ice conditions permitted. Russell Point was passed on August 29, and a crossing via the Princess Royal Islands to Victoria Island was made on September 1.

POPULATION ESTIMATES

Daily records were kept of the number of birds seen: for the rarer species, the actual counts; for the commoner, estimates. In addition, Manning and Macpherson recorded the hours spent observing and walking, and Höhn kept similar records for his longer walks. From these data, estimates of the population density of most of the commoner species have been calculated for the different observing stations (*See* Table II, folder, facing p. 19).

TABLE I

Multipliers used to obtain population per square mile[1]

Yellow-billed Loon	1	Baird's Sandpiper	8
Pacific Loon	1	Semipalmated Sandpiper	8
Red-throated Loon	5/4	Buff-breasted Sandpiper	8
Brant	1	Sanderling	8
Old-squaw	2	Red Phalarope	6
King Eider	3/2	Pomarine Jaeger	3
Rough-legged Hawk	1	Parasitic Jaeger	3
Peregrine Falcon	1	Long-tailed Jaeger	3
Willow Ptarmigan	3 to 5	Glaucous Gull	1
Rock Ptarmigan	3 to 5	Sabine's Gull	2
Little Brown Crane	2/3	Arctic Tern	2
Semipalmated Plover	6	Snowy Owl	1
Golden Plover	3 to 4	Horned Lark	8
Black-bellied Plover	3 to 4	Raven	1
Turnstone	5	Pipit	10
Pectoral Sandpiper	8	Lapland Longspur	10
White-rumped Sandpiper	8	Snow Bunting	10

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[1] To obtain the number of birds per square mile, the number seen was multiplied by the relevant figure given above and the result divided by the hours of observation. Occasionally, a small adjustment was made to take account of special circumstances.

To arrive at the estimates it was necessary to assume that the time spent observing was divided proportionately to the area of the different biomes at each station, and also to consider the different distances at which the various species can be seen, as well as the proportion which actually were seen. In general, the multipliers given in Table I have been used to convert the number recorded per hour to the estimated number per square mile. In some species, adjustments have been made to allow for the difficulty of seeing incubating females, the greater ease of recognizing flocks, and other special circumstances. Except for a few minor adjustments, the multipliers are the same as used by Manning (1948, 1949), so that the population of the Banks Island stations may be compared with those at places on the mainland barrens and northwestern Ungava.

In order to show the change in population over the seasons, the records at some of our longer halts have been broken down into two or more periods. The estimated population of each station is the average for the period of observation as shown at the left of Table II, except that at places where this period commenced prior to the first recorded arrival of the species on Banks Island for the year in question, the estimated population is for the period after the species is known to have been in the area. The dates are those between which bird records were kept and do not always quite correspond with the dates of our arrival and departure. As far as possible, the stations are listed in clockwise order, starting at the southeast of the island. The records of Manning and Macpherson in 1952 have been lumped together, since frequent checks indicated that essentially the same system of counting and estimating was used. When they were walking together, a mean of the estimates was recorded for a period of half the total man-hours. Manning and Höhn also compared notes during the walk from Sachs Harbour to Big River and found that their estimates were in reasonable agreement. Manning's figures for this walk were used in Table II. The figures given for the populations at the individual stations include migrants and juveniles, but not nestlings or downy young.

Although Höhn confined his work to the southwestern part of Banks Island, principally the region around Sachs Harbour, and although the main work of Manning and Macpherson was not ornithology, so that the stations they occupied could not be selected nor the long walks designed to give a cross-section of the country, it is thought that most habitats were visited on some occasion during the 455 man-days spent on the island.[1] We have therefore attempted to make a numerical estimate of the population of the whole island, 24,600 square miles, for most species, calculated from weighted estimates of the individual stations. Unless otherwise stated, the total population figures include breeding and non-breeding adults and subadults, but not juveniles or nestlings, and refer to a period at the height of the breeding season. We realize that in some cases errors may be considerable, certainly greater than estimates based on planned sampling. However, it is believed that the figures give a truer picture than the use of subjective terms such as 'abundant' or 'scarce'. Where these terms have been used, they indicate the frequency with which a species is likely to be observed; for instance, Snowy Owls, with a population of one per square mile, are considered abundant, whereas a small bird with the same population density would be considered scarce.

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[1] An exception is the lakeland country on the east side of the island near the head of Thomsen and Bernard rivers.

WEATHER CONDITIONS

The summer of 1951 was unusually ice-free in the Beaufort Sea, and in late August and early September the weather was predominantly good in the region of Banks Island. On September 2, it was remarkably warm and sunny at De Salis Bay, and even the 2,000-foothills north of Nelson Head were still snow-free. Nor was there snow anywhere along the west coast of Banks Island on September 7.

When Manning and Macpherson arrived at De Salis Bay on May 10, 1952, the country was still uniformly snow covered, except for a few bare areas on the beaches bordering the lagoons and near the edge of the mud cliff at Cape Cardwell and of the cut-bank at the north side of the harbour. On the following day, even these places were covered by new snow, and they continued alternately to thaw out and be snowed over until May 30, when the first rain fell. On June 1, the snow was melting rapidly, and there was some water on the ice; by June 2, two-thirds of the low land was snow-free, and next day some of the small streams were running. On June 6, only a few patches of snow remained on the flat land. However, the weather was still cold, and until Manning and Macpherson left for Sachs Harbour on June 16, it was seldom comfortable to walk without mitts for any extended period. By June 14, the ice on the lakes had lifted, and the water around their edges was knee deep, but there were still snowdrifts under the ridges.

On crossing the Masik Pass on June 17, it was at once obvious that spring was much further advanced on the western side of the island. Later, the Eskimo confirmed that the snow had gone at Sachs Harbour distinctly earlier than at De Salis Bay. The first mosquitoes were seen at Raddi Lake on June 19, and became troublesome on the southwest coast on June 23. They did not appear about De Salis Bay until the beginning of July and never became numerous. In the Masik Valley, many species of plants were in flower on June 26.

The summer of 1952 was fine and dry, but not particularly warm until July 22, when a westerly gale began and blew continuously for five days, accompanied at times by rain and snow. After this there was only one fine, warm period, from August 10 to 12. Snow fell at Castel Bay on the night of August 19, and the ground did not again become completely bare. Ten days later the Thomsen River froze over. On September 7, there was a foot of snow on some of the inland areas between Thomsen River and Storkerson Bay, but south of there, on the west coast, the weather had apparently been milder, and there was less snow on the land and less ice on the lakes. At Cape Kellett, even as late as September 20, there was only a sprinkling of snow, and the ground was still unfrozen an inch or two below the surface.

In 1953, spring commenced early on Banks Island, as in many other parts of the north. On May 10, a quarter to a third of the land under the Sachs Harbour ridge and to the south of Sachs River was snow-free, and by May 19 almost all the snow had gone from these areas. However, on May 15 at Cape Kellett and in the region to the north of the Sachs ridge, there were only a few small patches of bare ground. These patches were mostly along the edge of the cliffs and on top of some of the ridges. During the rest of May, the amount of bare ground gradually increased, but no appreciable area of the lower grassy country was snow-free until the end of the month. Then most of the birds moved off the barren ridge tops to areas where there was better cover and feeding. On June 2, the wind shifted to the south for the first time in about a week. This brought an influx of migrants, and a number of species were observed for the first time. About a sixth of the land near Cape Kellett was then snow-free, and a few small pools of water began to form. A visit on June 6 to the valley of the Kellett River showed conditions there to be less advanced than at the Cape, and birds to be less plentiful. By June 16, almost all the snow had gone from Cape Kellett, but the flatter Kellett Valley was still half snow-covered (Plate IIIB). However, birds had become more plentiful there and outnumbered those at the Cape. A little water was running in the river, but it was still possible to walk across it on the snow bridges. According to the Eskimo, crossing would have been impossible on June 2 of the preceding year. The weather remained cold throughout June, and on the last day of that month the land was still two-thirds snow-covered 20 miles inland from the mouth of the Lennie River. Near the mouth of the river there were only patches of snow, although these increased north of Storkerson Bay, especially toward Bernard River, where many of the small, shallow lakes were still ice-filled on July 9. However, about eight miles inland from the mouth of the Bernard River, summer was much further advanced. Signs of an earlier spring increased toward Muskox River, in the valley of which Sparrow had seen patches of bare ground on May 20.

Conditions on the north coast during the latter part of July and August were probably normal for the region, with moderately fine warm weather when the wind was off the land, and cold fog with temperatures about freezing when it blew from the northwest off the ice. Half a dozen mosquitoes were seen in the valley of Muskox River on July 14. They appeared again and for the last time at Investigator Point on August 7, when they were quite troublesome for a few hours. The first heavy snow, about 2½ inches, fell in the Cape Hamilton region on August 23. Other storms occurred during the next few days, and it is unlikely that the ground again became bare in that region. At Russell Point, however, only a few patches of this snow were left on August 29, and opposite the Princess Royal Islands the country was completely snow-free on September 1.

It seems probable that the snow always thaws decidedly earlier in southwest Banks Island, particularly below the Sachs Harbour ridge and possibly in Masik Valley, than it does in the De Salis Bay region and the country farther north on both sides of the island. The comparatively early thaw about the upper Bernard, Muskox, and lower Thomsen rivers in 1953 may be unusual. In the autumn, the snow probably lies on the north coast earlier than it does a little way farther south, particularly near the east and west coasts, the difference being greater than would be expected on the basis of latitude alone.

TOPOGRAPHY

Banks Island has an area of about 24,600 square miles. The greatest elevation, 2,400 feet (Porsild, 1950, p. 51), is attained on Durham Heights, a 300-square-mile plateau lying behind the 1,100-foot Precambrian quartzite and trap cliffs at Nelson Head. This plateau is bordered on the northeast by the valley of the Nelson River. At the northeast of the island between

Mercy Bay and Parker Point is another rocky plateau, bordered on the north by 800-foot cliffs and steep scree slopes, which drop directly to the sea or to narrow, stony outwash fans in the vicinity of the rivers. This plateau occupies an area of some 2,000 square miles and has an estimated maximum height of 1,200 to 1,500 feet. It is formed principally of hard Devonian (*See* Porsild, 1950, p. 51) limestones and sandstones, with occasional beds of softer shale and hard but poor coal. Stony-bottomed ravines with steep scree slopes and numerous exposures of solid rock cut it in all directions. Along the main watershed, which lies well to the east of the island between this northeastern plateau and Durham Heights, are rolling, barren hills, surfaced by gravel, stones, and mud mixed in varying proportions. In the south, these hills have been deeply cut by the broad, flat-bottomed valley of Masik River and its tributaries, occasionally exposing a crumbly, red-patinated rock, which is probably of Lower Cretaceous age (*See* Manning, 1953, p. 180). Farther north, particularly about the headwaters of the Bernard and Thomsen rivers, is the only extensive area of Banks Island where large and medium-sized lakes are numerous. Between the broad valleys of the westward-flowing rivers lie tongues of hilly country, and north of the Sachs and Kellett rivers are pronounced southerly facing scarps, below which the snow thaws early.

Remnants of a third plateau, with heights estimated to be up to 1,200 feet, lie about 30 miles south of Cape M'Clure. The surrounding hills, sometimes with open, rounded valleys, and sometimes with steep-sided, flat-bottomed valleys, are composed principally of soft shales and mud, with some seams of coal. In the east they stretch as far as Mercy Bay; in the south, to the latitude of the central part of Muskox River; whereas to the west, the land slopes gradually toward the coast. Along most of the north coast west of Mercy Bay, rounded gravel or mud-topped hills, which sometimes terminate in steep mud or shaly slopes, are usually separated from the sea by lagoons or a few hundred yards of flat land. At Cape M'Clure there is a 500-foot, vertical, limestone cliff, with similar but smaller cliffs to the east and west.

Much of the east coast is bordered by mud cliffs up to about 50 feet high. Elsewhere the rather barren, muddy, gravelly, or stony ground slopes up quickly to the rolling hills which form the main watershed of the island. Mud cliffs also border the coast at Cape Collinson, and between the Masik River and Sachs Harbour, and again between Mary Sachs and Cape Kellett.

The west coast is low, with numerous small, shallow lakes at the head of the bays and in the broad valleys of the rivers. There are sand and gravel beaches along much of the shore, and the small, shallow bays are frequently guarded by long spits and sandbars. At only a few of the points are there small mud cliffs which mark the termination of the low, rolling hills that lie between the rivers. Inland, the hills become higher, perhaps reaching 500 feet in places. There are, however, extensive areas of grassy plain, notably near the northwest tributary of Bernard River.

VEGETATION

The southern extremity of Banks Island is about 150 miles north of the tree-line. Scrub willow 2½ feet high is fairly abundant in the valleys of the Nelson, Masik, and probably Rufus rivers. It also grows in a few sheltered places about De Salis Bay but was not seen in any quantity farther north. Creeping willow is found over almost all the island. The valleys are usually well vegetated, with grassy marshes in the lower, flatter places, and *Dryas* and other common arctic flowering plants on the drier slopes. The hill slopes on the western side of the island are covered by a fair amount of vegetation, but their tops are more barren. On the east, particularly about De Salis Bay and along the coast, the hill slopes are also usually barren, except for creeping willow and narrow borders of *Dryas* around the earth polygons. This appears to be due to lack of moisture during the summer as well as to solifluction and the spring run-off, which carries away the fine mud in little rivulets and prevents the formation of soil. O. J. Morin (Bernier, 1910, p. 171) mentions "an abundant vegetation of moss" on top of the northeast plateau. If this refers to caribou moss, it is one of the few places where it occurs in any quantity on Banks Island. Arctic Bell-heather, *Cassiope tetragona*, is also scarce in most localities and berry-bearing plants are almost entirely lacking.

Although it would be possible to map with some accuracy from air photographs the areas on Banks Island occupied by the major biomes, it would be very time-consuming, because the areas are often small and isolated. A rough estimate places marshland, including areas of small lakes separated by dry peat hummocks, the lower regions of willow scrub, and the grass marshes proper, at 20 per cent; well and moderately vegetated areas where *Dryas* predominates at 50 per cent; and barren upland regions and hill slopes almost devoid of vegetation at 30 per cent. The greater part of the marshland is along the west coast and in the valleys of the larger rivers; most of the bare country is along the main watershed and on the eastern coast, including the De Salis Bay region.

COLLECTING AND RECORDING STATIONS

Major Walks and Land Journeys

Between Cape Cardwell and Schuyter Point. 1952. July 13-14. 24 hrs. (Manning).

The outward route followed the marshes and willow scrub bordering Cardwell Brook and continued to midway between Milne and Schuyter points over the barren hills which rise to 1,200 feet. The return was along the top of the mud cliffs, where vegetation was also sparse. Birds were scarce in all areas.

De Salis Bay (northeast). 1952. May 10-15. 15 hrs. May 18-21. 31½ hrs. May 27–June 16. 143 hrs. June 29–July 3. 17 hrs. (Manning, Macpherson).

The De Salis Bay base camp was on the north side of the lagoon east of the harbour. Between this and the harbour was a small brackish lagoon 150 yards in diameter and about two feet deep. At the first thaw, a foot of water formed on the ice of this lagoon and proved a great attraction for ducks and brant. The surrounding country consisted of low, rolling hills, on which almost the only vegetation was *Dryas integrifolia* growing on the borders of the otherwise bare mud polygons. In the valleys there was more vegetation and sometimes true grass marshes (Plate II A). One marsh that we visited fairly frequently lies just east of the lagoon. A little willow scrub, 1 foot to 1½ feet high, grew in this marsh, but the best willow growth was in a valley 4 miles inland. Even there it was not very extensive and not over two feet high. About 5 miles north of the camp, the hills rose rather steeply to 1,300 feet (Plate II B). On top was rolling plateau country, similar in most respects to the lower land near the bay. This plateau was visited on June 10, when it was still half snow-covered, and the only birds seen were a pair of Rock Ptarmigan. There are no rocky outcrops, but at Cape Cardwell the steep mud cliffs dried almost as hard as rock. Normal walks covered a radius of up to 5 miles from camp, with occasional longer ones covering a 12-mile radius.

De Salis Bay (west). 1952. May 16-17, 23. 15 hrs. June 16-17. 6 hrs. July 6-9, 17. 21 hrs. (Manning, Macpherson).

Except for the slope up to Masik Pass and the tops of the surrounding hills, the country west of De Salis Bay supports rather more vegetation than that to the east. At the extreme west of Windrum Lagoon, Pass Brook runs through a marshy area. Under the ridges at either side of the marsh are fairly extensive areas of scrub willow about eighteen inches tall. In the valley leading up to Masik Pass are small outcrops of basalt or fine-grained gabbro. At the southwest corner of the lagoon some bare ground and a few pools of water made an area of sand dunes exceptionally attractive to birds during May, although practically none were seen there in July.

Cape Collinson. 1952. May 24. 3 hrs. (Manning). June 28-29. 6 hrs. (Manning, Macpherson). July 20. 5 hrs. (Manning).

The shoreline of Cape Collinson is formed by crumbling mud cliffs similar to those at Cape Cardwell. On May 24, there was an area of bare ground 100 to 400 yards behind these cliffs.

The Valley of the Nelson River. 1952. July 21-25. 17½ hrs. (Manning, Macpherson).

Only the south side of the valley was examined. Most of the time was spent just below the sparsely vegetated, rolling foothills of Durham Heights. The screes which lay above them were visited on one occasion. At the bottom of the valley are grass marshes and large areas of rather dense scrub willow growing to a height of 1½ to 2 feet. Birds appeared to be scarce everywhere, but this may have been caused by the gale, which, accompanied by snow and rain squalls, blew throughout our stay.

Valley of the Masik River. 1952. June 17-19, 26. 22 hrs. (Manning, Macpherson).

About 8 miles from the top of Masik Pass the valley broadens out and is well vegetated, with a fair number of grass marshes and drier areas of tussock *Dryas* and deep, dry peat deposits, intersected by gullies. Scrub willow is plentiful and in places grows to a height of about 2½ feet.

Uplands south of the valley of the Masik River. 1952. June 27-28. 15 hrs. (Manning, Macpherson).

This country has an average height of about 800 feet. In general it is very barren, with vegetation only along the borders of the polygons. However, in places there are grass marshes and lakes. There was no appreciable amount of willow. As might be expected, birds were scarce.

Between the valley of the Masik River and Raddi Lake. 1952. June 19, 24-26. 10 hrs. (Manning, Macpherson).

There are some vegetated and some marshy areas in the narrow bottoms of the valleys. The hill slopes are barren, and birds were scarce.

Between Raddi Lake and Sachs Harbour. 1952. June 20-24. 45 hrs. (Manning, Macpherson).

The route followed from Raddi Lake was along the north side of the river, at first through some rather barren country, but later through marshes and dry peat deposits (Plate III A) where there was a fair amount of willow. Low hills of loose sand were also crossed. The return route was on the southern side of the river, often fairly near the sea, which is bordered by mud cliffs. Lakes were fairly numerous.

Sachs Harbour area. 1952. Sept. 15-18. 12 hrs. (Manning, Macpherson). 1953. May 12-14. 10 hrs. May 29. 7 hrs. (Manning). May 10–July 29, with occasional short absences. (Höhn).

The area covered in 1952 included a walk across the valley of the Kellett River. In 1953, Manning's observations were confined to the narrow strip of sloping land lying below the ridge between Mary Sachs and Sachs Harbour. Höhn's walks about Sachs Harbour were usually restricted to a radius of about 4 miles. They included the coastal area, the southern side of the Kellett River valley, and the flat, rather sandy, lakeland country south of Sachs River. Seal-hunting trips to the floe, about 10 miles southwest of Sachs Harbour, each of about eight hours' duration, were made with the Eskimos by dog-team on May 13, 15, 17, 22, 25, and June 5, and a dog-team trip to Cape Kellett, between June 10 and 12. The time occupied by Höhn's many short walks was not recorded; his population estimates therefore (Table II) are confined to certain of the longer walks. In the Sachs Harbour area these were as follows:

1) Between Sachs Harbour and Cape Kellett, May 19-21. 14 hrs.
2) Sachs Harbour to 4 miles west along the coast, May 27. 6 hrs.
3) Between Sachs Harbour and the mouth of the Sachs River, June 15, 20, 21. 15 hrs.
4) Between Sachs Harbour and the Kellett River, July 13, 18. 14 hrs.
5) Between Sachs Harbour and Mary Sachs, July 15. 7 hrs.

Cape Kellett region. 1952. Aug. 1. 5 hrs. (Manning, Macpherson). Sept. 20-21. 6 hrs. (Manning). 1953. May 15-28, May 30–June 6. 47½ hrs. June 7-19. 52½ hrs. (Manning).

This region includes the area within the triangle formed by Cape Kellett, the northern side of the valley of Kellett River, and Mary Sachs. On August 1, Manning walked from about 3 miles north of Cape Kellett overland to the cliffs near Mary Sachs, while Macpherson spent his time on the coast. On September 20 and 21, Manning remained within a radius of about 2 miles of the Cape. The 14 hours spent walking between Sachs Harbour and Cape Kellett on September 19 and 21 have not been included, as no birds were seen.

In 1953, Manning's camp was at the base of the spit that runs seaward for about 4 miles from Cape Kellett. Normal walks covered a radius of about 5 miles from the Cape, and included about equal amounts of fairly well-vegetated country with some grass marshes, and rather barren gravel and mud-topped ridges. Manning visited the Kellett River on June 6 and camped there from June 10 to 13, and from June 15 to 17, so that in all, 39 of the 52½ hours of bird observation in the Kellett region between June 7 and 19 were spent in the low marsh and dry peaty country of Kellett River valley (Plate III B).

Between Sachs Harbour and the Egg River. 1953. May 31, June 2. 18 hrs. (Höhn).

Both outward and return journeys were made by dog-team, with several Eskimos, over snow-covered country.

Egg River. 1953. May 31–June 2. 5 hrs. (Höhn).

The Egg River valley at the site of the Snow Goose colony has a flat floor one mile to 1½ miles wide. At the time of Höhn's visit it was nine-tenths snow-covered, with scattered areas of bare mud and many small channels apparently connected to the river. It is probably the latter feature that makes this area attractive to the breeding Snow Geese.

Sachs Harbour to 6 miles north of the Lennie River. 1953. June 28–July 1. 25 hrs. (Manning, Höhn).

The route ran north-northeast from Sachs Harbour to Lennie River; then followed Lennie River to within about 6 miles of the coast, and reached the coast some 6 miles north of the river mouth. The valleys of Kellett and Lennie rivers are fairly marshy with numerous small lakes. The intervening country consists of rolling, sparsely vegetated hills up to about 500 feet high. When traversed, up to two-thirds of this upland area was snow-covered.

Big River to Kellett River. 1953. July 2-3. 16 hrs. (Höhn).

The route followed usually lay about 3 miles inland.

From 6 miles north of Lennie River to Wolley Point. 1953. July 2-5. 28 hrs. (Manning).

The route followed the low coast, sometimes along the beach, and occasionally along offshore sandbars and over the ice between them to avoid the deep inlets of the larger rivers, particularly Big River, but more often it lay 2 or 3 miles inland where there were low hills, up to about 100 feet high, or marshy flats with small lakes. The time spent crossing the centre of Storkerson Bay, principally in fog, has not been included.

South side of Storkerson Bay. 1952. August 5. 11½ hrs. (Manning, Macpherson).

The country covered is somewhat similar to that about De Salis Bay, although there is more marshland and in general more vegetation, but little if any scrub willow.

Wolley Point to Bernard River. 1953. July 6-9. 25 hrs. (Manning).

The route north of Storkerson Bay followed the coast rather more closely than that on the south side. North of the Adam River the land bordering the shore is flat with grass marshes and numerous lakes. A short distance inland are the usual rolling hills. The mouth of the Bernard River was avoided by crossing to Bernard Island and back to the mainland on the north side of the river.

10 miles north of Adam River. 1952. Aug. 8-9. 5 hrs. (Manning, Macpherson).

On August 8, Macpherson walked along the low shore to the north, and Manning walked inland a few times over tussocked *Dryas* to a 150-foot spy hill.

Bernard River to Thomsen River. 1953. July 9-17. 60 hrs. (Manning).

The route followed the Bernard River, usually in the broad, flattish valley where there are grass marshes, areas of tussock *Dryas*, and numerous lakes, but occasionally the more barren hills which border the north side of the valley were crossed. Near the northwest tributary the country is flatter, with wide expanses of grassland, but as the height of land is approached, it becomes gradually more hilly. The Muskox and Thomsen rivers flow through fairly wide, flat-bottomed, steep-sided valleys in which lakes are plentiful. Near Thomsen River the hills rise to 700 and occasionally to 1,000 feet. The cache about 12 miles up Thomsen River was reached on July 15, but 6 hours of walking in the neighbourhood on July 17 have been included.

Antler Cove region. 1952. Aug. 13-16. 10 hrs. (Manning, Macpherson).

Most of the rolling hills, which rise to 300 feet, are covered by a fair growth of tussocked *Dryas*, and are thus better vegetated than similar country at De Salis Bay. Along the sea cliffs and valley sides are occasional small exposures of solid rock (*See* Plate IV A).

Between Castel Bay and Mercy Bay. 1952. August 20-28. 60 hrs. (Manning, Macpherson). 1953. July 20–August 8. 36 hrs. (Manning).

In August, 1952, and from July 20 to August 2, 1953, the camp was at Mahogany Point; from August 3 to 8, 1953, at Investigator Point. At the former place there is about half a square mile of flat, moderately marshy country near the shore. Half a mile inland the hills rise steeply to about 500 feet, but behind them the upland country is well vegetated, although it is entirely lacking in lakes and has few real marshes. Although there is some flat land along the shore of Mercy Bay, the hills rose directly behind the camp at Investigator Point. Near both camps were cliffs of mud, shale, and sand, and near Mahogany Point, one hill was capped by hard limestone surrounded by rocky screes.

Gyrfalcon Bluff. 1953. August 11. 4 hrs. Back Point. 1953. August 12-20. 32½ hrs. (Manning).

Gyrfalcon Bluff is a rocky hill with a 300-foot cliff (Plate V A). Most of the country around Back Point is low and rolling, with a fair amount of vegetation in the valleys and with rather barren gravelly hills. There are no lakes and not much marshy country, except along the shore where there are also salt-water lagoons. On August 16, rocky, hilly country about Cape Hamilton was visited for a few hours.

Pim Ravine. 1953. August 24-27. 13½ hrs. (Manning).

The area covered included the stony-bottomed, steep-sided ravine, the outwash fan along the shore, and the plateau above the 800-foot screes and cliffs. The whole area was covered with 2 to 3 inches of snow (Plate IV B).

15 miles south of Russell Point. 1953. August 30-31. 4 hrs. (Manning).

Mostly rather barren mud and stony country with some *Dryas*. Snow in patches.

Thomsen River to Storkerson Bay. 1952. September 2-10. 80 hrs. Storkerson Bay to Sachs Harbour. 1952. September 11-15. 40 hrs. (Manning, Macpherson).

Both these journeys were over snow-covered country. Birds were scarce.

CANOE JOURNEYS

1952

Around De Salis Bay. July 4-19. 17 hrs. (Very slow in ice.)
Mills Creek and Windrum Lagoon. July 5-19. 8 hrs.
De Salis Bay to Nelson Head. July 20-21. 10 hrs. (Inside ice.)
Nelson Head to Sachs Harbour. July 27-29. 17 hrs. (Bad weather for last 4 hours.)
Sachs Harbour to Cape Kellett. July 31–August 1. 4 hrs. (Bad weather; no records taken.)
Cape Kellett to 3 miles north. August 1. 1 hr.
3 miles north of Cape Kellett to Storkerson Bay. August 2-3. 16 hrs. (Foggy at times.)
Storkerson Bay to Cape Prince Alfred. August 6-11. 23 hrs. (In ice as far as Bernard Island.)
Cape Prince Alfred to Antler Cove. August 11-12. 18 hrs.
Antler Cove to Castel Bay. August 19. 12 hrs. (Travelling amongst ice. No birds seen.)

1953

Thomsen River cache to Mahogany Point. July 17. 3½ hrs. on river. 3 hrs. on Castel Bay.
Mahogany Point to Investigator Point. August 2. 5 hrs. (Weather mostly bad. No birds seen.)
Investigator Point to Back Point. August 8-12. 24 hrs. (Along tidewater at edge of pack ice on west side of Mercy Bay, and in lagoons on east side.)
Back Point to Russell Point. August 22-29. 21 hrs. (Mostly amongst pack ice. Practically no birds seen. Species recorded mentioned in text only.)
Russell Point to Princess Royal Islands. August 31–September 1. 16 hrs. (Mostly open water. Weather moderate.)

PREVIOUS ORNITHOLOGICAL WORK

On September 7, 1850, a party from H.M.S. *Investigator*, Commander J. Le. M. M'Clure, landed for a few hours near Nelson Head. The expedition then sailed up Prince of Wales Strait and wintered near the Princess Royal Islands. The next year, after attempting to get through Prince of Wales Strait to the north, they sailed south and west around Banks Island, and on September 29 reached Mercy Bay, where they wintered. The ice in Mercy Bay did not break up the following summer, and they spent another winter there. On June 3, 1853, the *Investigator* was abandoned, and the crew went by sledge to H.M.Ships *Resolute* and *Intrepid*, which had wintered at Dealey Island. A number of zoological specimens were collected but abandoned at Mercy Bay, and although a few were saved by Krabbé (1855, p. 715), they apparently did not reach England (Armstrong, 1857, p. 603). Armstrong, surgeon to the expedition, lists the specimens of birds collected but does not give the place where they were obtained except as "*the Polar Sea*" (Armstrong, 1857, p. 602). Fortunately he makes frequent reference to the birds in the text, and the relevant references have been included here. As with all sight records, the correctness of the identification of some species is doubtful, and as, for the most part, they are only casually mentioned in a popular account, it is usually impossible to gauge their abundance; also, reference to the birds is often made by group terms (e.g., gulls, ducks). The other accounts of this expedition (M'Clure, 1854, 1855a, b; Osborn, 1856) give little ornithological information.

The spring of 1852 was exceptionally late and the summer unusually cold, so that it is surprising how many birds were seen at Mercy Bay. On June 12, M'Clure (1854, p. 50) says there was as much snow as in the depth of winter, and the average temperature for that month was 31½°F. It was June 16 before the first water appeared on the ice (Armstrong, 1857, p. 526). On the 20th of August the temperature fell to 27°F., and on the 27th to 19°, and the young ice on the pools and leads was 2½ inches thick (M'Clure, 1854, p. 51). In 1851, all the birds appeared to have left Ballast Beach by the beginning of September, but a flock of ducks was seen near there on September 12 and 13, and also at Mercy Bay on September 26 (Armstrong, 1857, pp. 425, 432, 434, 466). In 1852, the 'aquatic birds' left Mercy Bay about the middle of August (Armstrong, 1857, p. 545). In 1851 and 1852, Collinson made a few brief landings on southern Banks Island and a sledge journey up Prince of Wales Strait from Walker Bay, where he was wintering with H.M.S. *Enterprise*, but few references to birds are given in his accounts (Collinson, 1855a, b, 1889).

Between 1914 and 1917, Stefansson (1921) and other members of the 1913–18 Canadian Arctic Expedition made several journeys across Banks Island both in winter and summer, but since mention is seldom made of definite species or areas, not much useful information on the birds can be obtained from the various accounts.[1] However, about 70 specimens in the National Museum were collected, mostly at Cape Kellett (actually probably near Mary Sachs, which was the main base for the expedition) by G. H. Wilkins and P. Bernard. Some of these specimens are listed by Anderson (1917).

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[1] There are two popular accounts in book form (Montgomery, 1932; Noice, 1925) of parts of this expedition which include reference to Banks Island, but they are valueless from an ornithological viewpoint as are also the brief official reports given in the Annual Reports of the Department of Naval Service.

In 1944, about ten specimens were collected by an Eskimo, Charlie Smith, who is now employed at the Mackenzie Reindeer Station. These were all taken in the southwestern part of the island (oral communication).

In 1949, Porsild (1950, oral communication) made landings at ten places on Banks Island between July 30 and 31 and between August 10 and 25. However, except at a lake 25 miles west of Cape Russell, where he was camped from August 10 to 21 and August 22 to 24, he had only a few hours for exploration work at each stop. His main work was botanical, but he published the first entirely ornithological paper on Banks Island (Porsild, 1951). The summer of 1949 was unusually late, and many birds that usually breed on Banks and Victoria islands either did not reach their nesting ground or failed to breed. Between July 20 and 31, 1952, Smith and Sutton (n.d.) made a circular flight over the southern half of Banks Island to check on the numbers and distribution of Snow Geese, but fog lay in patches over some of the most important areas.

SYSTEMATIC LIST

Gavia adamsi (Gray), Yellow-billed Loon, *Tudlik*[1]

The Yellow-billed Loon is a moderately common summer resident and probably nests throughout Banks Island, including the extreme northern part, although as yet there are no records for the Queen Elizabeth Islands. It may be expected in greater numbers in the lakeland area about the headwaters of Thomsen and Bernard rivers than in any region investigated. Taking this into consideration, the total adult population of Banks Island is estimated to be 3,000.

On July 13, 1852, two loons, one weighing 10½ pounds, the other 11¼ pounds, were shot at Mercy Bay. These were referred to *Colymbus glacialis* by Armstrong (1857, p. 536), but were doubtless this species, which was not described until 1859 (A.O.U., 1931). A female was collected on Banks Island by C. Smith on July 8, 1944. Porsild (1951) saw no young Yellow-billed Loons but noted adults on nearly all lakes visited, and daily from August 11 to 21, 1949, on the larger lakes in the vicinity of his camp, 25 miles west of Russell Point. He took a male on August 14.

In 1953, the wind being in the right direction on May 26, Yellow-billed Loons were heard for the first time at Cape Kellett on the open water about a mile to the south. Three were seen at the floe edge, 6 miles southwest of Sachs Harbour on June 5, and, judging by the number seen flying over Cape Kellett, some probably remained at sea, at least until mid-June, perhaps because of the exceptionally late spring. They were first seen flying over Cape Kellett on June 2, and in 1952, at De Salis Bay, where the floe edge was at least 30 miles distant, on June 6. In 1952, they were last seen near the north coast on September 2, when two flew south over the junction of Muskox and Thomsen rivers, and near the west coast between September 9 and 11, when four were observed near Storkerson Bay, where some of the medium-sized lakes were still partly open.

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[1] The Eskimo names were obtained by Höhn from the Banks Island Eskimos, who speak fluent English. Nonetheless, a few misunderstandings did occur, which have been kindly pointed out by Dr. A. E. Porsild, who suggested that some of the remaining differences between the present list and his own (Porsild, 1943) may result partly from the varied origin of the present Mackenzie Eskimos, amongst whom the Banks Islanders are included, and partly from the use of different, more or less descriptive names by different individuals or even the same individual at different times. Minor differences may result from different orthography. Anderson (1913) also lists the names used for birds by the Mackenzie Eskimos.

TABLE III

Numbers seen from the canoe and (in brackets) numbers seen per hour

Place	Date	Hrs.	Yellow-billed Loon	Pacific Loon	Red-throated Loon	Black Brant	Old-Squaw	King Eider	Red Phalarope	Pomarine Jaeger	Glaucous Gull	Sabine's Gull	Arctic Tern
N. side of De Salis B....	July 4-19, 1952	17	13 (.76)	4 (.24)	11 (.65)	—	250 (15.)	35 (2.1)	—	—	15 (.88)	—	—
Windrum Lagoon and Mills Creek	July 5-19, 1952	8	25 (3.1)	20 (2.5)	4 (.50)	4 (.50) + 1 downy	110 (14.)	—	—	—	42 (5.3)	—	3 (.37)
De Salis B. to Nelson Hd.	July 20-21, 1952	10	—	—	—	—	400 (40.)	35 (3.5)	—	—	3 (.30)	—	—
Nelson Hd. to Sachs Har.	July 27-29, 1952	17	2 (.12)	2 (.12)	4 (.23)	1	100[1](5.9)	120 (7.1)	—	—	80 (4.7)	—	—
C. Kellett to 3 m. N. of C. Kellett..........	Aug. 1, 1952	1	—	—	1 (1.0)	—	50 (50.)	100 (100.)	—	—	—	1000 (1000.)	—
3 m. N. of C. Kellett to Storkerson B.........	Aug. 2-3, 1952	16	5 (.31)	3 (.19)	5 (.31)	50 (3.1)	1450 (91.)	1300 (81.)	—	—	1000 (63.)	500 (31.)	200 (12.)
Storkerson B. to C. Prince Alfred......	Aug. 6-11, 1952	23	8 (.35)	—	6 (.27)	2	200 (8.7) + 50 young	500 (22.)	3 (.12)	—	50 (2.2)	250 (11)[3]	35 (1.5)
C. Prince Alfred to Antler Cove................	Aug. 11-12, 1952	18	—	—	—	20 in 1 flock	—	100 (5.6)	6 (.33)	—	12 (.67)	—	—
Antler Cove to Castel B..................	Aug. 19, 1952	12	—	—	—	—	—	—	—	—	—	—	—
12 m. up Thomsen R. to Mahogany Pt........	July 18, 1953	6½	—	—	—	100[2]	6 (on sea)	—	—	—	—	—	—
Around Mercy B.......	Aug. 9-12, 1953	26	—	—	3 (.12)	30 in 1 flock	—	30 (1.2)	—	3	48 (1.8)	—	—
Nr. Parker Pt..........	Aug. 29, 1953	—	—	—	—	—	—	50	—	—	—	—	—
15 m. S. of Russell Pt. to Princess Royal Is.....	Aug. 31–Sept. 1, 1953	16	4 (.25)	1 (.06)	—	—	10 (.62)	150 (9.4)	25 (.16)	—	8 (.50)	—	—

[1] Includes 70 within mouth of Masik River.

[2] One flock of 50 on river, and one of 50 on sea.

[3] None seen north of Bernard River.

TABLE IV

Measurements of Canadian and Alaskan Adult *Gavia adamsi*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
Straightened wing.............	10	369-387	379.5 ± 1.9	6.0	1.6 ± .36	8	366-388	372.7 ± 2.2	6.3	1.7 ± .42
Bill from posterior edge of nostril	9	81.0-87.0	84.53 ± .61	1.84	2.2 ± .51	6	80.4-90.1	83.33	—	—
Tarsus......................	8	88.5-97.8	94.38 ± .90	2.55	2.7 ± .68	8	87.3-95.0	90.44 ± .86	2.43	2.7 ± .67

Origin[1] of specimens. Alaska (arctic coast), 2 ♂♂ (Fort Yukon), 1 ♀; Franklin Bay, 1 ♂; Banks Island, 2 ♂♂, 2 ♀♀; Victoria Island (Walker Bay), 2 ♀♀; Dolphin and Union Strait, 3 ♂♂, 3 ♀♀; Fort Reliance region, 2 ♂♂. All taken between June 8 and August 14.

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[1] The place or area where the specimens measured or otherwise examined in detail originated will only be given with the precision which probable or possible geographical variation indicates as desirable.

Yellow-billed Loons were particularly numerous in early July, 1952, about the open water along the shore of De Salis Bay and on Windrum Lagoon, where a flock of nine was noted on July 10. On July 6, 1953, 19 were counted in a 2-mile walk along the edge of the large lagoon just south of the Adam River. Probably these were not nesting. According to MacFarlane (1908, p. 295) and to the Banks Island Eskimos, the nests of the Yellow-billed Loon are hard to find; however, Bailey (1948) lists 22 sets of eggs from Alaska. We observed only one pair which showed evidence of having a nest. They were defying a fox, apparently successfully, beside a lake at an altitude of about 800 feet south of Masik Valley on June 27, 1952.

A female collected at Sachs Harbour on June 11 weighed 6.3 kg., and a male obtained on July 18, 5.7 kg.[1] The bursae fabricii and thymus of this bird were large, but it was in normal adult summer plumage, and the testis measured 15 mm. by 4 mm. We cannot recall seeing, or at least recognizing, any yearling loons of this or of the other three species in the Canadian Arctic; neither are there any yearling skins from there in the National Museum. Presumably they keep to the sea (Cf. Salomonsen, 1950–1, p. 21) and perhaps do not penetrate far into the inland waters of the Canadian Archipelago.

Gavia arctica pacifica (Lawrence), Pacific Loon, *Malare*

The Pacific Loon is a moderately common summer resident in the southern part of Banks Island, but appears to be less numerous toward the northwest, probably because of the scarcity of large lakes. It is doubtless plentiful in the lakeland area near the headwaters of Thomsen and Bernard rivers. The Flemming collection, now in the Royal Ontario Museum of Zoology, contains specimens from the Carey Islands west of Thule, Greenland (Hersey, 1917, p. 285), but there appear to be no records from the Queen Elizabeth Islands. The estimated adult population of Banks Island is 2,000.

Porsild (1951) considered it common in northeastern Banks Island, where he observed adults but no young on the larger lakes.

In 1953, the first Pacific Loon was seen at Cape Kellett on June 10, and at Sachs Harbour on June 20. In 1952, a loon, probably of this species, was seen at De Salis Bay on June 12, but the first certain identification was two days later.

Several of the Pacific Loons seen in 1952 and 1953 showed evidence of having nests, and all those observed at De Salis Bay at the end of June and the beginning of July were in pairs. On July 24, 1952, a nest with one unhatched egg and one partially hatched was found beside a medium-sized lake in Nelson Valley. A gale was causing waves to break over the nest, and the partially hatched chick did not survive, perhaps because of our disturbance. Another nest with two eggs was found on a strip of grass in a lake less than three feet deep near the Kellett River on July 18, 1953.

Three of the specimens in the National Museum show green reflections on the throat, but the backs of their heads and necks are no darker than normal for *G.a. pacifica*. However, one, a male taken at Barter Island on July 5, 1914, is rather large (straightened wing: 314 mm.; bill from posterior edge of nostril: 49.1 mm.; tarsus: 80.7 mm.), particularly the tarsus, and

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[1] Unless otherwise stated, all the weights were taken by Höhn in 1953.

TABLE V

Measurement of Adult *Gavia arctica pacifica*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Straightened wing					Straightened wing				
Alaska, western Canadian Arctic. .	17	281-314	297.6 ± 1.9	8.0	2.7 ± .46	12	279-307	292.8 ± 2.6	8.9	3.0 ± .62
Eastern Canadian Arctic.	3	289-300	294.3	—	—	7	280-305	292.1	—	—
	Bill from posterior edge of nostril					Bill from posterior edge of nostril				
Alaska, western Canadian Arctic. .	16	45.2-51.8	48.65 ± .52	2.06	4.2 ± .75	9	43.9-49.7	47.07 ± .65	1.95	4.1 ± .98
Eastern Canadian Arctic.	3	47.0-51.5	50.0	—	—	7	44.4-49.8	47.60	—	—
	Tarsus					Tarsus				
Alaska, western Canadian Arctic. .	17	71.8-79.0	75.44 ± .50	2.08	2.8 ± .47	10	67.3-76.0	71.25 ± .83	2.61	3.7 ± .82
Eastern Canadian Arctic.	3	70.7-76.0	74.2	—	—	7	68.8-77.8	72.71	—	—

Origin of specimens. *Alaska, western Canadian Arctic:* North coast of Alaska, 9 ♂♂, 6 ♀♀; Mackenzie Delta, 1 ♂, 2 ♀♀; Banks Island, 1 ♂, 2 ♀♀; Victoria Island (Walker Bay), 2 ♂♂, 2 ♀♀, (Cache Point), 1 ♂; Dolphin and Union Strait, 3 ♂♂; Coronation Gulf, 1 ♂. All taken between June 10 and August 7, except for the Coronation Gulf specimen which was taken in October. *Eastern Canadian Arctic:* Baffin Island, 3 ♀♀; south Hudson Bay (Churchill), 1 ♂, 1 ♀, (Little Cape), 1 ♂, 2 ♀♀; James Bay, 1 ♂, 1 ♀. All taken between June 17 and August 1.

might represent an intergrade with *G.a. viridigularis.* It has therefore been omitted from Table V. Another (unsexed), from Southampton Island or Cape Fullerton, is not unusually large if a male. The third, a female, was taken at Sachs Harbour on July 16, 1953. The throat is less green than those of the other two, and since there is no other abnormality, it has been included in the table and is considered merely a variant of *G.a. pacifica.*

The weights of adult specimens taken at Sachs Harbour in 1953 were as follows: ♂, July 6, 2.7 kg.; ♀, July 6, 2.3 kg.; ♀ July 16, 2.5 kg.

Gavia stellata (Pontoppidan), Red-throated Loon, *Kchagsauk*

The Red-throated Loon, a circumpolar species which nests throughout Arctic Canada northward to north Ellesmere Island (MacDonald, 1953), being satisfied with smaller lakes by which to nest, is a rather more common and more evenly distributed summer resident of Banks Island than the two preceding loons. The estimated adult population of the island is 5,000.

In 1852, the summer being exceptionally late, the first Red-throated Loon was shot at Mercy Bay on June 23. Later, when the water began to form, they arrived in considerable numbers, and several were killed (Armstrong, 1857, p. 529). Porsild (1951) noted two pairs on a small lake near Russell Point but saw no young.

Red-throated Loons are one of the last birds to arrive, or at least to come inland from the floe, probably being later than either of the other loons. In 1952, the first was seen at De Salis Bay on June 14; in 1953, at Sachs Harbour on June 13, and at Cape Kellett on June 15.

Several of the Red-throated Loons seen in 1952 and 1953 were evidently nesting, but on our longer walks we did not often stop to seek the nests. However, a female with a complete egg in its oviduct was collected on July 3, 1952, at De Salis Bay, and a flightless juvenile, no doubt from an unusually late nesting, was seen on September 11 being fed by its parent at a small open hole in an otherwise frozen lake, 10 miles south of Storkerson Bay. On June 29, 1953, a nest with two eggs was seen near the Kellett River, and on July 6 a nest with one egg a little north of Storkerson Bay.

The maximum wing lengths given in Table VI are distinctly smaller than those (♂, 310 mm., ♀, 308 mm.) given by Witherby *et al.* (1948), although the minimum figures are approximately the same. In this species, the straightened and flattened wings are nearly comparable, and the differences could indicate a greater average wing size in the palaearctic populations, some specimens from which are probably included in the series of Witherby *et al.* (1948). There is great variation in bill wear (apparently more than in the other loons) even amongst specimens taken on the same date and from the same area.

An adult female taken at Sachs Harbour on July 8 weighed 1.6 kg.

TABLE VI

Measurement of Adult *Gavia stellata*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Straightened wing					Straightened wing				
Alaska, western Canadian Arctic..	11	273-295	282.9±2.1	7.1	2.5±.54	11	260-274	268.5±1.3	4.4	1.6±.35
Eastern Canadian Arctic.........	7	271-293	278.3	—	—	12	258-287	273.3±2.5	8.6	3.1±.64
	Bill from posterior edge of nostril					Bill from posterior edge of nostril				
Alaska, western Canadian Arctic..	10	46.0-52.7	49.04±.65	2.05	4.2±.93	11	43.0-48.6	46.17±.49	1.63	3.5±.75
Eastern Canadian Arctic.........	7	43.2-51.6	47.93	—	—	11	43.7-53.1	46.77±.82	2.71	5.8±1.23
	Tarsus					Tarsus				
Alaska, western Canadian Arctic..	10	71.8-78.5	75.10±.72	2.27	3.0±.68	11	64.0-71.7	68.50±.77	2.54	3.7±.79
Eastern Canadian Arctic.........	6	66.2-74.4	71.77	—	—	12	65.0-74.0	69.75±.65	2.24	3.2±.66

Origin of specimens. *Alaska, western Canadian Arctic:* North coast of Alaska, 4 ♂♂, 3 ♀♀; Mackenzie Delta, 1 ♀; Banks Island, 3 ♂♂, 2 ♀♀; Victoria Island (Walker Bay), 1 ♂, 1 ♀, (Simpson Bay), 1 ♂, 1 ♀; Dolphin and Union Strait, 1 ♂, 2 ♀♀; Prince Patrick Island, 1 ♂, 1 ♀. All specimens taken between June 10 and August 1. *Eastern Canadian Arctic:* Ellesmere Island, 2 ♂♂, 4 ♀♀; Baffin Island, 5 ♂♂, 2 ♀♀; Ungava Bay, 1 ♀; Coates Island, 1 ♀; Thelon Sanctuary (Sifton Lake), 1 ♀; west Hudson Bay (Chesterfield), 1 ♀; (Churchill), 1 ♀; James Bay, 1 ♀. All collected between June 8 and August 29.

Fulmarus glacialis minor (Kjaerbølling), Short-billed Fulmar

Armstrong (1857, p. 213) saw one or more fulmars near Nelson Head on September 7, 1850. Since there appears to be no record for the Pacific Fulmar east of Point Barrow (Bailey, 1948), it seems probable that they were Atlantic birds. This is certainly true (Cf. Rand, 1948b; Fisher, 1952, p. 17) of an unsexed, dark-billed, pale-phased specimen taken by P. Bernard at Cape Kellett on July 27, 1916, which is clearly referable to *F.g. minor.* Its measurements are as follows: straightened wing, 301 mm.; exposed culmen, 34 mm. approximately; depth of bill measured through the gonys (*See* Wynne-Edwards, 1952a, p. 98), 13.9 mm.; tarsus, 49.5 mm.

Olor columbianus (Ord), Whistling Swan, *Kugiuk*

The Whistling Swan is a fairly common summer resident on southern Banks Island, but it was not seen in 1952 or 1953 north of Kellett River. However, in the latter year, when we had the best opportunity to see birds along the west coast, the spring was exceptionally late. If Whistling Swans do not normally nest north of the latitude of Kellett River in any part of Banks Island, the total adult population is estimated at 400, or about .1 per square mile for the region south of latitude 72°. The greatest concentration, .3 per square mile, is along Sachs River valley below Raddi Lake. It is possible that another hundred pairs nest in eastern Banks Island near the headwaters of Thomsen River.

M'Clure (1854, p. 50) says that about June 12, 1852, "... wildfowl, consisting of swans, geese and all descriptions of ducks, began to arrive, but finding no water, merely took a flight round the N.W. extreme of the land, and returned to the southward, ...". Swans are not mentioned by Armstrong (1857), and therefore too much reliance should not be placed on M'Clure's statement. However, Sabine (1824) says that, although not numerous, swans breed in the North Georgian Islands[1], and a single specimen was obtained, probably from Winter Harbour on Melville Island. Also, a single bird flying high over Winter Harbour on May 23, 1909, was thought to be a swan (McMillan, 1910). The only swans seen on Banks Island by Porsild (1951) were three on August 24, 1949, on a lake near De Salis Bay.

In 1952, the first pair of swans seen at De Salis Bay settled on the lagoon ice on May 29, and then flew off to the southwest. At that date the lakes were still completely frozen, and only the ridges were free from snow. Two single birds and one pair were seen at the east side of De Salis Bay between June 5 and 11, and two pairs on July 3. During our walk from Raddi Lake to Sachs Harbour and back, between June 20 and 24, 14 pairs of swans were seen. Two of these birds were on nests. On July 6, near Windrum lagoon, a swan stayed for half an hour within fifty yards of Manning, but no nest or young could be found. Two pairs, which were seen each day between July 21 and 24 on lakes near our camp in the Nelson River valley, appeared to have neither nests nor young. In 1953, two swans were seen together at Mary Sachs on May 29, and one near Cape Kellett on June 7.

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[1] The chart accompanying Parry (1821) shows the North Georgian Islands to extend from Melville Island to Cornwallis Island inclusive, roughly occupying an area covered by the present Parry Islands.

*__Branta canadensis__ subsp., Canada Goose, *Uluarulik*

Occasional references by Stefansson (1921) to 'Hutchin's Geese' on Banks Island and farther north obviously refer to Brant. However, the Banks Island Eskimos told us that Canada Geese are occasionally killed in the Sachs Harbour and Egg River region. Three small flocks of dark geese seen in the distance at De Salis Bay on May 19, 23, and 27, 1952, might have been this species, as the dates are abnormally early for Brant. Smith and Sutton (n.d.) reported seeing a few dark geese (apparently other than Brant) not positively identified during their flight along the west Banks Island coast between July 20 and 31. The Canada Goose is a fairly common breeding bird on the mainland to the south of Banks Island (MacFarlane, 1908; Preble, 1908), although between Anderson and Mackenzie rivers at least, particularly on the coastal tundra, they are less plentiful than the White-fronted Goose (Smith and Sutton, n.d.). There is no certain knowledge of the race represented in the area south of Banks Island (Delacour, 1951).

Branta bernicla hrota (Müller), American Brant

The American Brant breeds throughout the eastern Canadian Arctic westward on or near the mainland, at least as far as Ellice River, Queen Maud Gulf (Gavin, 1947), and in the Queen Elizabeth Islands west to Prince Patrick Island (Handley, 1950). In Banks Island it seems to be of casual occurrence only.

In 1952, a careful watch was kept for American Brant on Banks Island, but none were identified. Under some lighting conditions, particularly when viewed from the side, the breasts and bellies of the Black Brant appeared quite pale, but whenever we were able to obtain a better view of the questionable birds it was seen that they were definitely Black Brant. In 1953, American Brant were no longer expected, particularly on the western side of the island. Brant were therefore examined less critically. There can be no doubt, however, that the vast majority of the Brant seen about Cape Kellett in 1953 were the dark-breasted form, although one taken there by Sparrow in 'early June' is a pale-breasted bird. A pale-breasted adult female in the National Museum was also taken by C. Smith in southwest Banks Island on June 17, 1944, and a single male juvenal was seen and collected near the shore, 15 miles south of Russell Point, on August 31, 1953. All three specimens are darker than typical[1] *B.b. hrota* from eastern Canada. Bailey (1948) records apparently similar atypical *B.b. hrota* from Alaska, and a perfectly typical adult female *B.b. hrota* in the National Museum collection was taken at Barter Island, Alaska, on June 30, 1918. There are four downy young in the National Museum collection. One, a female, about a day old, was taken at Taverner Bay, Baffin Island, on July 24, 1940. One male and two females about three days old were taken on Southampton Island between July 19 and 20, 1952. All agree closely with the description given by Witherby *et al.* (1948). The upper parts best match Mouse Gray[2], but there may be some individual variation, since some years ago it was noted that the backs of some Southampton

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*Hypothetical.

[1] See under *B.b.nigricans* for a discussion of the relationship of the two races and intergrades.

[2] Capitalized colours are from Ridgway 1912, unless otherwise indicated.

Island British Museum specimens of similar museum age varied from Smoke Gray to near Drab Gray (one specimen). The fresh soft parts of No. 29356 were described as follows, using the colour chart in Chapman (1932) for the capitalized colours: bill, from base to and beyond nostril, Slate Color with a faint greenish tinge, followed by a black band, broadest on top; tip, Ochraceous Buff, except for the white egg tooth; eyes, dark Brownish Gray; legs, Slate Color, with a greenish-grey mid line at back; claws, black above, greenish-grey below; webbing, black above, Slate Color below.

Branta bernicla nigricans (Lawrence), Black Brant, *Nellernaluk*

The Black Brant nests at least as far east as Perry River (Gavin, 1947; Hanson *et al.* 1956), and northward to Prince Patrick Island (Handley, 1950; MacDonald, 1954). On Banks Island it is an abundant summer resident and probably nests wherever the terrain is suitable. The non-breeding birds especially tend to concentrate in the coastal regions, particularly the western and southwestern lowlands, where, for the first 20 miles inland, the average adult and yearling summer population is estimated at 12 per square mile. The average population over the rest of the island must be much lower, since there are large areas which are clearly unsuitable for geese, although even along the valley of Bernard River, Brant were rather scarce once the coastal region had been left. The total adult and yearling population of Black Brant on Banks Island is therefore estimated at 80,000.

Previous Records

On September 7, 1850, several flocks of Brant were seen near the shore in the valley of Nelson River, and on August 19, 1851, large numbers of Brant were seen from the *Investigator* while she was sailing between Storkerson Bay and Cape Prince Alfred (Armstrong, 1857, pp. 213, 391). M'Clure (1854, p. 54) gives the total number of geese killed by his ship's company in the arctic regions as 29. Probably most of these were Brant killed at Mercy Bay where Armstrong (1857, p. 537) says they were common in mid-July and an easy prey while moulting. The National Museum has an adult (male?) and two juvenals (females?) taken by G. H. Wilkins on August 31, 1914, at Cape Kellett; an adult male taken by P. Bernard on June 9, 1915, from the same place; and another adult male taken on Banks Island, probably in the southwest, by C. Smith on July 6, 1944. At De Salis Bay on August 24, 1949, Porsild (1951) saw a flock of 28 Black Brant including some young of the year.

Migration

On June 2, 1953, the wind, which had been northeast for some time, shifted to the south. This appeared to be the signal for the arrival of several fresh species, including the Black Brant, about 300 of which were seen coming in from the south or southwest in flocks of two to fifty during three hours of observation at Cape Kellett. On the same day, Höhn, while returning from Egg River to Sachs Harbour, saw about 350. On June 3 and 4, Brant were still abundant in pairs and small flocks around Cape Kellett, although none were seen actually arriving. A day or two later, most had moved from the Cape, but they were still plentiful in the marshes, particularly near the mouth of Kellett River. The season was much farther advanced in 1952 when the first two flocks (2 and 14) of Brant were definitely identified at De Salis Bay on June 5. On June 7, a flock of six was seen, and between June 9 and 14, flocks of two to seven frequently landed on a small, thawed lagoon near our camp.

The last Brant seen on Banks Island in 1952 were a flock of about 20, which fed for a time near our camp beside the frozen Thomsen River on August 31. In 1953 the last flock seen on the north coast was flying westward over the sea near Pim Ravine on August 28. As in the preceding year, the country was then snow-covered. Probably both flocks were migrants from Prince Patrick Island. Neither was observed sufficiently closely for American Brant or intergrades to be recognized.

Breeding and Predation

In 1952, Brant were not seen on our walks inland until June 14, when four pairs, apparently occupying nesting territories, were noted. Next day, three pairs were seen on the spit at the south side of the harbour. On June 29, three pairs were again noted on the spit, and a nest with eggs was found, but by July 2, this and another nest had been destroyed, probably by foxes. On July 1, two destroyed Brant nests were found a few miles inland, where the pairs had been seen on June 14. Foxes were plentiful and doubtless destroyed more nests than usual that year as the lemmings were extremely scarce after the crash in 1951.

Over half the Brant seen on our walk to Sachs Harbour were in small flocks. There were, however, a few scattered pairs and, about 10 miles from Sachs Harbour on an island in a lake on the north side of the Sachs River, a colony of 40 nests. On an island in another lake on the south side of the river and about 20 miles east of Sachs Harbour, we saw 15 nesting pairs.

On July 6, 1952, a colony of Brant was found on a bare, silty island in a lake about 2 miles west of Windrum Lagoon. Thirty-eight nests were counted, and about 25 eggs lay scattered about the island. As there was no vegetation, the eggs were lying either on the bare mud or on down. A pair of Glaucous Gulls also nested on the island within a few yards of the nearest Brant nests and of scattered eggs, which they had apparently not molested. When this colony was next visited on July 17, two sets of two eggs each were still unhatched. Each nest was attended by a male and a female. The eggs in one of the nests had been laid since the July 6th visit. Four downy young, about 24 hours old, and their parents were just leaving the colony; all were collected. The parents had not yet lost their primaries, although they made no attempt to fly and desert their young. However, two days earlier near the entrance to Windrum Lagoon the parents of a lone downy had abandoned it to the attack of two Glaucous Gulls when frightened by the approach of our canoe.

Many of the Black Brant arrived at Cape Kellett in pairs on June 2, 1953, or broke up into pairs when the flocks spread out to feed. Those remaining in flocks were probably all, or mostly, yearling birds. Three female yearlings were collected between June 7 and 11. Their largest ovarian follicles measured only 1 mm., whereas those of two adults taken on June 7 and 10 measured 17 mm. and 40 mm. respectively.

On June 13, three nests were seen on islands in a lake near Sachs Harbour. The only one that could be reached contained three eggs; one of the others was being robbed by a Glaucous Gull. Several nests were found while we were walking up the west coast in 1953, but no island colonies such as those mentioned above were seen. Time did not permit any particular search for nests, but certainly most of the Brant seen were not breeding. It is believed that the same was true of most of those seen near the mouth of Kellett River as late as June 17, although over half of these were in pairs or at least in twos. The exceptionally late spring may have discouraged breeding. On July 13, a nest with six eggs was found in the valley of Kellett River, and two downy young were seen with their parents. On July 17, four pairs, each attended by two or three young, were seen near Sachs Harbour. Next day a nest with four eggs and several pairs with young were noted.

In the valley of Kellett River on July 18, 1953, several wings of adult Brant, some still attached to the pectoral girdle, were found with owl droppings and pellets about a small hillock on which a pair of Snowy Owls were injury-feigning.

Taxonomy

The National Museum has 15 Brant from Prince Patrick Island, all collected by MacDonald (1954). They consist of one yearling male, five adult males, and seven adult females taken in 1949, and one adult female and one juvenal male taken in 1952. A selection of six of these birds, when laid out according to the colour of the lower breast, form a well-graded series from extreme pale *B.b. hrota* to moderately dark *B.b. nigricans.* The only grades missing were moderately dark *B.b. hrota* (grade 2) and an extremely dark *B.b. nigricans* (grade 8). These gaps were filled by a specimen from eastern Canada and a dark bird from Banks Island. The series (Plate VII), which then consisted of seven adult June birds and one yearling (grade 5) taken on July 4, was used as a standard for the comparison of the remainder of the specimens of both races in the National Museum. The results are contained in Table VII.

TABLE VII

Frequencies of Breast Colour in *B.b. nigricans* and *B.b. hrota*, Graded from 1 to 8

	hrota		intergrades				*nigricans*	
Standard grades.............	1	2	3	4	5	6	7	8
North coast of Alaska........	1	—	—	—	—	2	4	—
Banks Island................	—	—	3	—	—	10	11	2
Prince Patrick Island.........	2	—	2	2	3	2	3	1
Eastern Canada, Greenland...	9	7	2	—	—	—	—	—

This table may be interpreted as follows: the normal colour range of *B.b. hrota* in eastern Canada is grade 1 to 2, with a few birds being as dark as grade 3, perhaps because of intergradation with *B.b. nigricans*, but more probably through individual variation without such relationship.

However, since the three *B.b. hrota* collected on Banks Island are grade 3 birds, and since apparently similar birds occur in Alaska (Bailey, 1948), it is probable that they are intergrades, possibly originating on Prince Patrick Island, although the very pale specimen (grade 1) taken at Barter Island on June 30, 1918, shows that a few, presumably pure *B.b. hrota*, occasionally wander and apparently summer far to the west. The colour range of true *B.b. nigricans* varies from grade 6 to grade 7, with an occasional darker specimen. From this it follows that at least five, possibly seven, of the 15 Prince Patrick Island specimens are intergrades. This is completely at variance with Handley (1950), who states that of 13 adults he collected on Prince Patrick Island in 1949, nine were *nigricans* and four *hrota*. However, if even one of the grades in Table VII were missing from Handley's collection, it would be possible to postulate a break in the series and classify the two groups separately, particularly if the rather small range of individual variation in non-intergrading populations had not been determined with adequate series.

In 1949, Handley (1950) apparently saw over two dozen pairs of Brant on Prince Patrick Island, but in no case were the Black and American forms mixed. One of the pairs seen by MacDonald (1954) that year consisted of a typical Black Brant female mated to a male which was "a great deal lighter below and very much resembled the Atlantic Brant". In 1952 he saw no mixed pairs.

It appears, therefore, that although there has been sufficient interbreeding between the American and the Black Brant for at least 30 ± 12 per cent of the population about Mould Bay to be intergrades, i.e., grades 4 and 5, mated pairs from the ends of the colour ranges, such as could be recognized in the field, are rare. This, however, is to be expected, if, as seems probable[1], pairing takes place on the wintering grounds or during migration when the two subspecies, as they must be considered, are geographically segregated. Mixed pairs which produce the intergrades would then be formed by only a proportion of those birds which lose their mates in the summer, perhaps only in the short period between arrival on the nesting grounds and the commencement of nesting.

In the absence of more definite information than is at present available (*See* Handley, 1950), it must be assumed that intergrades also occur in other areas of overlap. In one of these (Melville Island), Hennessey (1910) refers only to the American Brant (under *B.b. glaucogastra*), and the two specimens taken by the Bernier expedition, one a typical Black Brant (June 27) and the other a typical American Brant (July 6), are sufficient to show only that both forms occur but were not distinguished in the field.

Pure American Brant may become mixed with the Black Brant population as strays or, having become mated to a Black Brant, they may have a stronger urge to remain paired than to follow their normal migration route, but most of the pale-breasted birds in the Black Brant population are probably the offspring of these mixed pairs, migrating with their parents as a family. This would account for the somewhat intermediate character of the three Banks Island specimens (*See* American Brant) as well as those recorded by Bailey (1948) in Alaska. Even if it is assumed that the grade 1 *B.b. hrota* from Barter Island is a vagrant, it is evident from at least two records (Wales, Alaska, June 19, 1924 (Bailey, 1948), Banks Island, June 17) that some of these pale-breasted birds do not always return to breed in the region of intergradation. It could therefore be argued (*See* Rand, 1948a, p. 430) that they are part of the Black Brant population and should be classified as *B.b. nigricans.* Certainly the genes they carry will be added to the gene pool of that race, and unless eliminated by natural selection, will add to its variability. However, if, as appears from the variability of the Prince Patrick Island intergrades, the breast colour is under polygenic control, it seems unlikely that grade 3 phenotypes would persist beyond the second or, at most, the third generation, or originate by mutation or re-combination of the controlling genes after these were scattered amongst the *B.b. nigricans* population by interbreeding. In this case[1], therefore, it appears that the actual genetic conditions and relationship may be best expressed by calling obviously light-breasted specimens *B.b. hrota* even when they occur within the population of *B.b. nigricans.* Naturally the same argument holds for *B.b. nigricans* occurring within the American Brant population, although this appears to be a less common occurrence (Cf. Delacour and Zimmer, 1952).

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[1] As stated above, most, and possibly all, the adult Black Brant arriving at Cape Kellett were paired, but these may have been third year or older birds. The critical period, when segregation of the races is necessary for their maintenance, is when the yearlings are first forming attachments.

TABLE VIII

Measurements of Adult Typical (grades 6 to 8) *B.b. nigricans* from Banks Island, 12 ♂♂, 5 ♀♀; Franklin Bay, ♀; and Alaska, 3 ♂♂

	♂♂					♀♀		
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean
Straightened wing..	12	330-352	338.1±1.9	6.4	1.9±.39	6	315-329	324.2
Exposed culmen....	14	32.2-35.6	33.34±.26	.99	3.0±.56	6	30.0-32.2	31.43
Tarsus...........	15	56.8-65.0	61.47±.65	2.50	4.1±.74	6	55.6-61.8	59.25

June, 6 ♂♂, 2 ♀♀; July, 5 ♂♂, 4 ♀♀; August, 1 ♂; September, 3 ♂♂.

Delacour and Zimmer (1952) restrict *B.b. nigricans* to an east coast population with unknown breeding ground. However, their description of the type suspiciously resembles Prince Patrick Island intergrades, some of which must surely migrate to the Atlantic Coast. The earlier spring migration of these dark-bellied birds through the Bay of Seven Islands (Lewis, 1937, p. 79) would also fit with the great distance that has to be covered. *B.b. nigricans* has therefore been tentatively retained as the name for the Black Brant of the Pacific Coast. Admittedly the type *B.b. nigricans* might still be closer to *B.b. hrota*, and therefore a synonym of it, or placed with that population on the grounds discussed with reference to *B.b. hrota* within the *B.b. nigricans* population.

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[1] When races are phenotypically less clearly marked, this method is obviously impracticable, but complete consistency is not mandatory or desirable.

Downy Young

The description of downy Black Brant given by Bent (1951) agrees fairly well with two specimens, well over twice hatching size, taken in Coronation Gulf on July 20, 1911, with their mother, a typical Black Brant (grade 7). Both these specimens and Bent's description are quite different from four siblings, about 24 hours old, taken on Banks Island on July 17, 1952, with their parents (♂=grade 6, ♀=grade 7). This may, in part, be due to individual variation, for the four Banks Island specimens are more variable than is common with sibling downies, but probably the differences chiefly result from differences in organic and museum age. The four Banks Island downies are distinctly darker, more 'blue', and easily separable from the four downy American Brant, with which they were directly compared. Their backs are between Mouse Gray and Deep Mouse Gray (some individual variation), becoming darker, Chaetura Drab on the head, and near Chaetura Black around the eye. The belly and lower breast are Smoke Gray, the latter being divided from the slightly darker upper breast by a white band. N.M.C. 39460 has rather less dark around the eye and on the chin and upper throat. N.M.C. 39458, the only specimen positively sexed as a male, entirely lacks the narrow white strip which, in the other three, extends from the bill for about 15 mm. down the throat.

An adult male Black Brant collected at Sachs Harbour on June 12, 1953, weighed 1.8 kg.

*Anser albifrons subsp., White-fronted Goose, *Tingmiak*

The Banks Island Eskimos told us that they occasionally see a few White-fronted Geese in the Sachs Harbour and Egg River regions. On June 24, 1952, Manning and Macpherson thought they saw one flying near the coast about half-way between Sachs Harbour and Masik River. It is also possible that some of the geese (*See* Canada Goose) seen in the distance at De Salis Bay in the spring were this species. It is a common nesting bird on the mainland barrens south of Banks Island (MacFarlane, 1908; Smith and Sutton, n.d.), and in that region the two races may meet (Hellmayr and Conover, 1948).

Chen caerulescens caerulescens (Linnaeus), Blue Goose, *Ganguk Igalik*

The most westerly record of the Blue Goose appears to be an adult, seen by C. H. D. Clarke, flying with a large flock of Snow Geese over Tuktoyaktuk on September 9, 1942 (Porsild, 1943). Possibly these were migrants from Banks Island, although Porsild says that the Snow Goose breeds on Richards Island, at the mouth of Mackenzie River.

The occurrence of Blue Geese on Banks Island has previously been reported by the Eskimos (Höhn and Robinson, 1951). In 1953, Höhn saw one at Sachs Harbour on May 27, and another on May 29. On that day Manning saw this or another flying north over Mary Sachs. On June 1, 1953, an adult and a yearling female Blue Goose were shot and collected at Egg River colony. Five others were seen by the Eskimos. Next day two were seen between Egg River and Sachs Harbour, and another at Sachs Harbour on June 6. One Blue Goose, apparently adult, in a flock of flightless Snow Geese, was banded on July 31.

In view of the intensive investigation of the Blue and Snow Geese, which has been made during the last few years by Graham Cooch, a detailed taxonomic study is unwarranted. However, the regularity with which the two forms interbreed in the area of contact (Manning, 1942; Cooch, 1953) is overwhelming evidence that they are not distinct species, a conclusion which seems generally acceptable (Salomonsen, 1950–1; Hanson *et al.*, 1956). Whether they should be looked on as dichromatic forms of the single subspecies *C.c. caerulescens* or as distinct subspecies, is a complex and controversial matter. Opinion of most ornithologists has favoured the former alternative. The tentative adoption of the latter here is in line with the suggestion of Manning (1942) and has been made after discussion with Cooch. The detailed reasoning, however, must be left for the publication of Cooch's reports.

A yearling female collected at Egg River on June 1 weighed 2.3 kg.

Chen caerulescens hyperborea (Pallas), Lesser Snow Goose, *Ganguk*

The total adult and yearling population of the Lesser Snow Goose on Banks Island is estimated to be 120,000. It is therefore more abundant, though less evenly distributed on the island than the Black Brant.

Snow Geese recorded in the eastern part of the Queen Elizabeth Islands are probably all *C.c. atlantica*, but three flocks, probably non-breeding birds, seen on Melville Island were almost certainly *C.c. hyperborea*. Two of these flocks, described as large and very wild, were recorded by Mecham (1855, p. 539, Chart) on July 26, 1853, on the north side of the entrance to Liddon Gulf; the other flock, listed under Greater Snow Goose by Hennessey (1910), was seen at Winter Harbour on August 28, 1908.

Previous Banks Island Records

On September 7, 1850, several flocks of Snow Geese were seen near the coast in the valley of Nelson River; about May 31, 1851, a flock was seen flying north near the Princess Royal Islands, and on August 19, they were seen on the west coast of Banks Island, apparently in large numbers, and probably both north and south of Storkerson Bay (Armstrong, 1857, pp. 213, 336, 384, 391). On May 31, 1852, the first two Snow Geese of the season were seen at Mercy Bay flying in a northerly direction, and two were shot on June 15 (Armstrong, 1857, pp. 521, 526).

Stefansson (1921, p. 365) apparently first began to see moulting Snow Geese in late July, 1915, soon after crossing Thomsen River, 75 miles inland on his walk from Mercy Bay to Cape Kellett. They became more numerous as he went south. No nests were seen. In late July, 1951, nine Victoria Island Eskimos, who visited the Canadian Arctic Expedition's headquarters at Mary Sachs, drove a flock of about 500 moulting geese, presumably this species, for about 5 miles into camp for slaughter (Stefansson, 1921, pp. 371-372). Three males and one female (N.M.C. specimens) were collected by P. Bernard between June 18 and July 20, 1915. No Snow Geese were seen by Porsild (1951) in 1949, although his pilot, Ernie Boffa, had noted large numbers in the interior of Banks Island in previous years. Between July 20 and 31, 1952, Smith and Sutton (n.d., pp. 10-11) flew along the western coast of Banks Island, and in the relatively small section that weather permitted them to cover "... encountered an estimated 15,000 Snow Geese. These occurred in groups up to 250 in number and were composed of flying adults, flightless adults, and adults with young. The proportion of young seemed to be quite high so apparently the hatch had been successful . . .".

Migration

According to the Eskimos, most of the Snow Geese reach Banks Island near the mouth of Masik River, and spend about a week in the vicinity of Raddi Lake and the valley of Sachs River. The majority then fly westward down Sachs River and usually past Sachs Harbour to the gap in the hills at Mary Sachs, where they turn northward, heading for the main nesting colony at Egg River. In the autumn, they are said to fly more directly to Masik River where they feed for a while before crossing to the mainland. On August 16, 1953, Höhn saw two flocks, which he thought had probably come from Banks Island, flying southwestward over Baillie Island. However, this must have been well before the main southward migration.

In 1952, two Snow Geese were seen flying north over De Salis Bay on June 1, and between that date and June 8, 15 were recorded, mostly in twos. None were seen east of the highlands after June 8. In 1953, the Eskimos saw the first two flocks of Snow Geese at Sachs Harbour on May 16. On the 18th, 60 Snow Geese were seen there by Höhn, and 40 at Cape Kellett by Manning. Between May 18 and 26, Höhn saw 400 near Sachs Harbour. The main movement past there was on May 29, when he saw 1,000 to 2,000. Most of them flew along the coast to the west, but a few flocks crossed the ridge near Sachs Harbour and presumably headed direct for Egg River. On this day, Manning estimated that 1,000 Snow Geese came from the east and turned north at Mary Sachs between 1000 hours and 1400 hours, and during a 6-hour walk from there to Sachs Harbour and back, 4,000 were seen, either flying or feeding between the shore and the ridge. Flocks continued to be seen flying in the Sachs Harbour area until June 18.

Other Distribution Records in 1952 and 1953

Between June 20 and 24, 1952, 84 (1.17 per square mile) Lesser Snow Geese were seen between Raddi Lake and Sachs Harbour, mostly in flocks of four to ten. On July 29, a flock of five was seen at the mouth of Masik River; on August 2, Manning and Macpherson began to see flocks from their canoe about 10 miles south of Big River, and from their camp about 3 miles south of that river, up to 500 adults flying or walking on the flats could usually be seen during that evening and the following morning. On August 3, they saw 3,000 (375 per hour) adults in flocks of 25 to 100 birds while canoeing from Big River to Storkerson Bay, and at Storkerson Bay, a flightless flock of about 50, swimming near the shore. On August 5, 1,400 (93 per square mile) adults were seen in 11½ hours on the south side of Storkerson Bay, all apparently flightless and accompanied by twice their own number of young. No Snow Geese were seen on the west coast north of Storkerson Bay in 1952 or 1953, and Fred Carpenter, an Eskimo who had spent one or more summers at Adam River, could not recall seeing any there. However, on the east side of Castel Bay in 1952, Manning and Macpherson found large quantities of Snow Goose quills amongst the windrows of willow twigs, which had been brought down by the Thomsen River. In 1953, a flock of about 250 adult or yearling Snow Geese was seen about 20 miles from the mouth of the river on July 15, and two others, totalling about 500, about 10 miles from the mouth on July 18. There must at times be many more than this along the course of the river to account for the quantity of feathers washed up in the windrows.

At Cape Kellett in 1953, Manning saw 57 (3.5 per hour) between May 18 and 27. After May 29, they became more plentiful and 3,650 (48 per hour) were seen between June 1 and 19. Most of these were immature birds. From just south of Lennie River to the mouth of Big River, about 850 (38 per square mile) Snow Geese were seen between June 30 and July 2 in flocks of various sizes up to about 250. Some flocks appeared to be flightless but may merely have been disinclined to take off. Höhn saw a similar number on his return trip. All were doubtless non-breeding birds. Between Big River and the south side of Storkerson Bay, Manning saw 60 in three flocks. On July 13, the Eskimos rounded up two flocks of flightless Snow Geese totalling about 1,500 on the north side of Kellett River. Three birds from these flocks were examined by Höhn and were judged to be yearlings on the basis of their large bursae fabricii and thymus. Also seen were about 40 geese with young. The adults of this group were still able to fly. According to the Eskimos, the yearlings are the first to lose their primaries (Cf. Manning, 1942, p. 164).

Breeding

The Banks Island Eskimos, from their own observations and from what they have been told by the Victoria Islanders, who used to hunt caribou on Banks Island during the summer, believe that the only large Snow Goose nesting colony is at the Egg River, although in years when the snow is exceptionally late in thawing, a considerable number of these geese may nest in the valley of the Sachs River. This appears to have happened in 1953 but not in 1952. Höhn (Cf. 1954), who visited the Egg River colony between May 30 and June 2, 1953, found about 30,000 geese occupying the nesting ground. On these dates most of the country in the area was still under snow, but many eggs had already been laid. The largest clutch seen by Höhn numbered five, on June 1. The nests were on raised, snow-free areas of mud or grass separated by the still frozen, partly snow-filled, winding channels of the river. Many of the geese were standing about on the snow-covered river flats. Judging from the much larger area which the Eskimo, Bertram Pokiak, said was in most years equally densely occupied, Höhn estimated that the colony sometimes held 100,000 birds.

On June 13, a nest with five eggs was found a few miles west of Sachs Harbour; on the 27th, there were four downy young and one hatching egg in this nest. On July 10, two pairs of Snow Geese with four and seven downy young, respectively, were seen within a mile of Sachs Harbour settlement. Next day, two other pairs with five young each were seen in the same area. The flocks seen from the canoe and at the Big River in 1952 were too far distant to tell if they were accompanied by young, although presumably many of them were, for 3,000 half-grown young were with the 1,500 adults seen at Storkerson Bay on August 3 and 5. Storkerson Bay is about 40 miles north of the Egg River colony, and it is reasonable to think that the young may have travelled that distance by the beginning of August. However, the 40 adults accompanied by young, seen in the Kellett River valley on July 13, must have nested locally.

Predation

The Eskimos say that the Egg River colony is harassed by the Arctic Fox, although none were seen there by Höhn. Wolves are apparently not attracted to the colony. Whenever the Eskimos winter on Banks Island they visit the colony in the spring and, as in 1953, collect about 500 eggs and probably shoot 200 to 300 birds. They also shoot about 700 birds during the spring migration, and sometimes capture another hundred flightless geese in the valley of the Kellett River. On July 10, Höhn saw a downy young Snow Goose being killed by a Glaucous Gull near Sachs Harbour. Undoubtedly gulls and jaegers take a considerable toll of eggs and young at the Egg River colony.

Colour Aberrations

A Snow Goose shot by an Eskimo at Sachs Harbour on May 30, although otherwise in normal plumage, had two or three black secondaries in each wing. Another, shot on June 1 at the Egg River, had one almost pure white wing; only the three outer primaries were partly black. Some years ago, a Snow Goose with entirely white primaries was seen near Sachs Harbour by the Eskimo, Fred Carpenter. A similar goose was recorded at Meadows, Manitoba, on April 24, 1939 (Soper, 1940).

Banding Returns

Near the Kellett River on July 13, 1953, Höhn banded 78 flightless Snow Geese believed to be all, or nearly all, immature, probably yearling, birds. The following returns have been received:

Between Oct. 16, 1953, and Jan. 10, 1954.	Honey Lake, Lassen Co., California.
Oct. 19, 1953.	Bashaw, Alberta.
Dec. 8, 1953.	Tule Lake, Siskiyou Co., California.
Dec. 31, 1953.	Richvale, Butte Co., California.
Dec. 28, 1953.	Tule Lake, Siskiyou Co., California.
Jan. 6, 1954.	Sutter Wildlife Game Refuge, Sutter Co., California.
Mar. 11, 1954.	Chihuahua, Mexico.
Oct. 8, 1954.	Faust, Lesser Slave Lake, Alberta.
Oct. —, 1954.	Marengo, Saskatchewan.
Nov. 19, 1954.	Warner Valley, Adel Lake Co., Oregon.
Sept. 7-Oct. 17, 1955.	Daysland, Alberta.
Oct. 24, 1955.	Glamis, Saskatchewan.

A Snow Goose banded at Tule Lake Refuge, Siskiyou Co., California, Nov. 9, 1952, was shot by an Eskimo on May 30, 1953, near Sachs Harbour.

Weights

Höhn collected two adult males and a yearling female at Sachs Harbour during May, 1953. Two of these were weighed. The remaining weights are those of specimens taken by Manning at Mary Sachs and birds shot by the Eskimos at Sachs Harbour for food. All were taken between May 18 and 29.

Mean weight of 10 adult males = 3.05 (2.5-3.6) kg.
" " " 10 yearling males = 2.36 (1.8-3.2) kg.
" " " 6 adult females = 2.82 (2.5-3.1) kg.

Two immature females weighed 1.8 kg. and 2.1 kg. respectively.

Chen rossi (Cassin), Ross's Goose

According to the Banks Island Eskimos, a few Ross's Geese are sometimes killed on southwest Banks Island, but they are not seen every year. One was reported shot by Eskimos in May, 1947 (Höhn and Robinson, 1951). On July 13, 1953, Höhn banded a flightless Ross's Goose captured with a flock of several hundred Lesser Snow Geese in the Kellett River valley. On the mainland to the south of Banks Island they have been reported near the mouth of Horton River (Anderson, 1913) and at Fort Anderson (MacFarlane, 1908).

***Mareca americana** (Gmelin), Baldpate

On June 20, 1952, Manning obtained a good view of a pair of Baldpates on a small lake near Raddi Lake. Capt. F. Wolki reported having taken specimens once or twice at the mouth of Horton River on the mainland south of Banks Island (Anderson, 1913).

Anas acuta Linnaeus, Pintail, *Ivuak*

On May 31, 1852, a flock of "Pin-tailed Ducks (*Anas Caudacuta*)" was seen flying north over the Princess Royal Islands (Armstrong, 1857, p. 336). "The Brent Geese, Pin-tail and Long-tailed Ducks" were very numerous at Mercy Bay in mid-July, 1852 (Armstrong, 1857, p. 537). "Pintail and Longtail Ducks, (*Anas Caudacuta et Glacialis*)" were the last to arrive and last to leave Mercy Bay (Armstrong, 1857, p. 522). A few Pintails are to be expected on Banks Island since they are evidently quite common at Cape Bathurst (Anderson, 1913), and Porsild (1943) saw large flocks at Cape Dalhousie on the mainland about 150 miles to the southwest; in the eastern Arctic they have been recorded on Southampton and Baffin Island (Bray, 1943). Nonetheless, Armstrong's records might be dismissed had not simultaneous mention been made of the Old-squaw. As it is, it seems unlikely that Pintails were as numerous or stayed as late as these records imply, and the records must be treated with caution.

On May 18, 1953, Höhn saw a female Pintail which had been shot that day near the mouth of Sachs River. A male, which was not secured, had been with it. Two days later, the Eskimo, Charlie Gruben, saw two females and a male in the same area.

Clangula hyemalis (Linnaeus), Old-squaw, *Maliraluk* or *Ahanlik*

Old-squaws may be found on lakes throughout Banks Island, but they are most abundant near the low western coast, both at sea and on the lagoons and lakes. The total population of Banks Island and the surrounding sea is estimated to be 60,000, but because of the rather conspicuous

TABLE IX

Measurements of Adult *Clangula hyemalis*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Straightened wing					Straightened wing				
Alaska, western Canadian Arctic..	24	212-227	219.83±.73	3.57	1.6±.23	4	202-215	208.5	—	—
Baffin Island..................	17	209-230	220.24±1.22	5.04	2.3±.39	10	199-217	207.80±1.70	5.38	2.5±.55
Hudson, James bays............	5	214-226	218.4	—	—	15	200-217	207.47±1.35	5.21	2.4±.44
	Culmen					Culmen				
Alaska, western Canadian Arctic..	27	25.2-31.1	27.32±.25	1.27	4.7±.63	5	24.0-26.4	25.68	—	—
Baffin Island..................	17	24.6-28.3	26.61±.28	1.16	4.4±.74	11	24.5-27.3	25.76±.29	.98	3.8±.81
Hudson, James bays............	4	26.6-27.6	27.0	—	—	15	24.9-27.4	26.22±.22	.84	3.2±.59
	Tarsus					Tarsus				
Alaska, western Canadian Arctic..	27	33.7-37.8	35.68±.21	1.11	3.1±.42	5	33.5-36.2	35.1	—	—
Baffin Island..................	16	34.2-38.2	36.29±.28	1.13	3.1±.59	11	32.0-36.0	34.18±.38	1.25	3.6±.78
Hudson, James bays............	5	34.5-36.6	35.7	—	—	15	33.5-36.1	35.09±.20	.79	2.2±.41

Origin of specimens. *Alaska, western Canadian Arctic:* North coast of Alaska, 7 ♂♂; Mackenzie Delta, 1 ♂; Franklin Bay, 2 ♂♂; Banks Island, 8 ♂♂, 1 ♀; Victoria Island (Walker Bay), 1 ♀; Dolphin and Union Strait, 7 ♂♂, 1 ♀; Coronation Gulf, 1 ♀; Bathurst Inlet, 1 ♂; Great Bear Lake, 2 ♂♂, 1 ♀. Three Alaskan specimens were taken between September 8 and October 2; all the remainder between June 5 and August 25. *Baffin Island:* South Baffin Island, 17 ♂♂, 9 ♀♀; north Baffin Island (Bylot Island, Pond Inlet), 2 ♀♀. All taken between June 25 and August 23. *Hudson and James Bays:* Southampton Island, 2 ♀♀; west side Hudson Bay, 3 ♂♂, 2 ♀♀; Churchill, 1 ♂; York Factory, 1 ♂; east side Hudson Bay (Elsie Island), 2 ♀♀; James Bay, including Long Island and Cape Henrietta Maria, 9 ♀♀. All collected between May 30 and August 5.

The measurements of smaller collections from Prince Patrick Island, 7 ♂♂, 3 ♀♀, Ellesmere Island, 4 ♂♂, 2 ♀♀, Ungava Bay, 1 ♂, agree closely with the above figures.

flocks that may be seen at sea or in the coastal lakes throughout the summer, and the apparent scarcity of nesting birds, it is difficult to judge accurately the population size. The species breeds throughout the arctic islands and is common even at the extreme north of Ellesmere Island (MacDonald, 1953).

On August 19, 1851, Old-squaws were seen from the *Investigator* on the west coast of Banks Island north of Storkerson Bay, and in mid-July, 1852, they were numerous at Mercy Bay, where they were one of the last birds to arrive and leave (Armstrong, 1857, pp. 391, 522, 537). The ducks seen at Mercy Bay on September 26, 1851 (Armstrong, 1857, p. 466), were therefore probably this species. One yearling and three adult males in the National Museum were collected by P. Bernard at Cape Kellett between June 22 and July 2, 1915. Another adult male from Banks Island was taken by C. Smith in June or July, 1944. Porsild (1951) found the Old-squaw common on the lakes, and on August 10, 1948, saw several flocks of fledglings near his camp, 25 miles west of Russell Point.

In 1952, the first Old-squaws, five birds, were seen on June 7, and from then on, there were usually between one and twelve on the small lagoon near our camp. On June 14, two groups of about seven each and one pair were seen on inland lakes for the first time. By July 3, they were beginning to flock on the open water around the entrance to Mills Creek. In 1953, the Banks Island Eskimos saw the first Old-squaw at the floe off Sachs Harbour about April 10. On May 17, Höhn saw one at the floe, and on May 25, two flocks totalling about 40. He first saw them inland on a small lake near Sachs Harbour on June 6, and the next day Manning saw four flying over Cape Kellett.

In 1952, we found no nests, and saw comparatively few probable nesting pairs. However, nests of Old-squaws are difficult to find. In 1953, a nest with two eggs was found near the mouth of Kellett River on June 15, and on July 1 a nest with five eggs near Lennie River.

Table IX shows that there is probably little or no size difference between populations inhabiting different regions of arctic Canada. Neither could any constant differences in plumages be seen. Six yearling males from Hudson Bay and arctic Canada can easily be recognized by their retained and extremely worn juvenal tail feathers. These birds have only the upper part of the breast black, though in one, taken at Prince Patrick Island on July 21, 1949, the lower breast has a pale grey tinge. This is also shown by one juvenal (October 2) from Alaska. All the males with long tail feathers appear fully adult, although according to Witherby *et al.* (1948), such tails are occasionally grown during the first winter. Ten females from the Canadian Arctic and Hudson Bay are also clearly yearling birds with very worn tails. A few others in varying degrees resemble these in their dorsal feathering but have obviously post-juvenal tails. The largest ovarian follicle in one of these, taken at De Salis Bay on June 9, measured 6 mm., which suggests that it was going to breed. Probably all are merely slightly aberrant adults, and Witherby *et al.* (1948) imply that the tail feathers of the females are never moulted during the first winter.

Two adult males collected in the Sachs Harbour area on June 19 and July 21, respectively, weighed 1.4 kg. and 0.91 kg.

Somateria mollissima v. nigra Bonaparte, Pacific Eider, *Amaulik*

The Pacific Eider is a fairly abundant migrant at De Salis Bay, and a few remain there all summer, nesting on a little island in Windrum Lagoon. They also nest near the mouth of Sachs River and on Moose Island. The Pacific Eider, like its eastern relatives, seldom goes far inland, and prefers to nest on small coastal islands. These are scarce around Banks Island, and most of the migrants seen at De Salis Bay in 1952 probably nested on islands near the Victoria Island coast. The total population of the two known Banks Island nesting colonies together with the scattered pairs that nest near Sachs Harbour is probably not more than 500 pairs; another 1,500 non-breeding birds may spend the summer around the coasts.

Armstrong (1857, pp. 391, 522) mentions this species on the west coast of Banks Island north of Storkerson Bay on August 19, 1851, and at Mercy Bay. However, we saw no sign of nests on Mottley Island when we visited it on August 12, 1953. It may nest on the Gore Islands, which appeared suitable but were not examined. There are no records for the Queen Elizabeth Islands and no proved breeding colony north of Moose Island.

Three males and two females in the National Museum were collected at Cape Kellett by P. Bernard during the summers of 1915 and 1916.

In 1952, three female Pacific Eiders (one collected) were seen at De Salis Bay on June 2, and the next day a male flew over. From June 5 to 10, there were usually about 12 Pacific Eiders on the open water of the small lagoon near camp, and occasionally flocks flew over, mostly toward the east. On June 7, there were 15 Pacific Eiders (male collected) at the mouth of Cardwell Brook about 12 miles east of De Salis Bay. From June 10 to 15, not more than a pair were seen at any one time at the small lagoon (one male collected). Manning and Macpherson saw none inland before they left De Salis Bay on June 16, and none on their walk to Sachs Harbour before June 20, when they noted a pair on the Sachs River. Next day they saw 50 as they approached the mouth of that river, and on June 23, a pair near the coast east of Sachs Harbour. By June 29, when they arrived back at De Salis Bay, Pacific Eiders had returned to the lagoon, and about 15 (one female collected) could usually be seen there. Both sexes were represented, but they took little interest in each other. On an 8-hour walk inland on July 1, two males and five females were seen.

While canoeing from the southeast of De Salis Bay to Windrum Lagoon on July 4 and 5, 30 Pacific Eiders were seen, and next day there were six on Windrum Lagoon. On July 7, five nests were found on a bouldery island in the centre of this lagoon. There were six to eight females (three collected) and one male (collected) on or about the island. In the nests were four to seven slightly incubated eggs.

On July 7, both this species and the following were beginning to separate into flocks of males and females. After July 14, practically no mixed flocks or pairs were seen, and it became more difficult under most circumstances to distinguish between flocks of female Pacific and King Eiders. Between July 7 and 19, there was an average of 20 Pacific Eiders (two females collected) near the entrance to Mills Creek, less than 10 per cent of which were males. On July 13, a flock of six females and one male was seen in the open shore water near Milne Point. On July 29, about 10 male Pacific Eiders were identified between Cape Lambton and Sachs Harbour, and about 20 per cent of the 100 female eiders seen were probably this species. Only one Pacific Eider, a male in eclipse plumage, seen on August 2 south of the Big River, was definitely identified between Cape Kellett and Cape Prince Alfred. Judging by the proportions seen along the coast next July, some 200 of the 2,000 eiders seen there in 1952 were probably this species.

In 1953, the Eskimos said that Pacific Eiders first appeared at the floe opposite Sachs Harbour about April 10, and Höhn saw a total of 62 in six visits between May 20 and June 5. On June 7, he saw small flocks flying near the land in the Sachs Harbour area, and on June 10, 100 over the ice between Sachs Harbour and Cape Kellett. On June 15, they were seen inland for the first time, and Höhn counted 20 in a 2-mile walk south of the Sachs River, and Manning saw three males and three females flying over Cape Kellett. Nine others were seen flying at Cape Kellett between June 16 and 19. On June 17, Höhn flushed a female from a nest of five eggs at Sachs Harbour, and on June 21, another from a nest of three eggs. Another pair appeared to have a nest in the same area on June 25. Between July 5 and 17, nine Pacific Eiders were seen near Sachs Harbour. A downy young was brought in on July 14 by an Eskimo, and a nest with five eggs was seen the next day.

On July 1, two Pacific Eiders were seen on the coast a little north of the Lennie River, and on July 2 about fifty on the open water along the edge of the sand spits opposite the Big River. On Moose Island, which is a sparsely vegetated, sandy island, 20 feet high, 150 yards long, by 70 yards wide, 215 nests were counted, and the total estimated to be about 250 nests. The maximum number of eggs seen in any nest was 11; a few had only one. All except about eight nests were lined with down; a few tests indicated that the eggs in nests with down were slightly incubated, and those in nests without down were fresh. Males stood beside about two-thirds of the sitting females, but they usually flushed before the females left their nest. Thirty Pacific Eiders were seen after we left Moose Island on July 3, and seven others on July 4 to 5, before we reached Storkerson Bay. Fifteen were seen on July 6 between Storkerson Bay and the Adam River.

The only yearling Pacific Eiders in the National Museum collection are two males and two females taken from Franklin Bay in July, 1911, and 1914 by F. Wolki. A probable 2-year-old male with black-tipped secondaries was taken at Bernard Harbour on July 9, 1916, by R. M. Anderson. Probably young, non-breeding birds remain at sea (Cf. King Eider, p. 46) and possibly do not penetrate so far east along the arctic coast as the adults.

None of the 46 adult *S.m.v. nigra* studied showed evidence of intergradation with any of the Atlantic races, nor was there any trend toward these races in the easternmost material available (Dolphin and Union Strait and Coronation Gulf). In some male Pacific Eiders, the black "V" on the throat, though always quite clear and obvious, is much narrower and less well marked than in others. This is not associated with geography, and appears to be no more than individual variation, sometimes accentuated by feather wear. Female *S.m.v. nigra* may always be separated from typical *S.m. dresseri* and *S.m. sedentaria* by their narrow, pointed bill processes. From *S.m. borealis* they are usually separable by large size, greater distance from eye to tip of lateral bill feathering (Table X), which is more rounded at the tip and reaches closer to the nostril, as well as by the narrowness of the

TABLE X

Measurements of Adult *Somateria mollissima v. nigra* from the North Coast of Alaska and the western Canadian Arctic

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
Straightened wing..............	22	280-315	303.2 ± 1.9	8.9	2.9 ± .44	20	283-307	292.9 ± 1.4	6.3	2.2 ± .34
Exposed culmen................	25	44.4-54.0	49.44 ± .55	2.74	5.6 ± .78	20	42.0-51.4	47.00 ± .45	1.99	4.2 ± .67
Anterior border of eye to tip of lateral feathering..............	25	54.5-67.0	61.64 ± .60	2.98	4.8 ± .42	20	49.8-60.8	54.48 ± .59	2.64	4.8 ± .77
Tarsus......................	24	51.5-56.3	54.19 ± .29	1.43	2.6 ± .38	20	50.1-53.3	52.00 ± .19	.86	1.7 ± .26

Origin of specimens. North coast of Alaska, 3 ♂♂, 2 ♀♀; Mackenzie Delta, 1 ♀; Franklin Bay, 2 ♂♂; Banks Island, 6 ♂♂, 9 ♀♀; Victoria Island (Walker Bay), 1 ♂; Dolphin and Union Strait, 12 ♂♂, 8 ♀♀; Coronation Gulf, 1 ♂. All except one Alaska specimen (September 23) were taken between May 29 and August 18.

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[1] One 2-year-old male is included. Two year-old females were not distinguished from adults.

feathering separating the bill processes. However, none of these characters taken singly will separate all specimens. The narrowness of the feathering between the bill processes is associated with the tendency, mentioned by Kortright (1943), for these processes to lie more on the top of the skull in the Pacific Eider, and it may reflect a real and absolute difference in the bone structure of the skull. The above differences hold equally well in the males, which may also be separated by the black V on the throat and by the colour of the bill, which, in the dried skins of *S.m.v. nigra*, even those of juvenals, is yellowish-brown, quite distinct from the greenish black of most specimens of the Atlantic races.[1]

Although as yet very little is known of the birds along the arctic coast east of Coronation Gulf, it seems probable that there is a gap between normal ranges of the Pacific and the eastern races.[2] Lack of intergradation cannot therefore be considered definite evidence of specific distinctness. The marked difference between some of the freely interbreeding Atlantic races, the similarity between the eastern and western forms in nesting habitat, differing as it does from that of the King Eider, are, on the other hand, indications that they are indeed conspecific, though as yet this is far from proved, and the A.O.U. (1944) Check List has here been followed with an open mind. Further investigation of the breeding and other habits as well as comparison of adequate series of skulls might throw additional light on the matter.

The only specimen (an undated male in breeding plumage) examined from western Alaska (St. Michael), although normal in other ways, had a culmen measurement of 57.0 mm., which is 3 mm., or more than a standard deviation, longer than any of the 25 north coast males of Table X.

Only one downy young *S.m.v. nigra* has been examined. It was taken at Sachs Harbour on July 14, 1953, when evidently only a day or two old. It is very slightly paler about the head and neck than three comparable specimens of *S.m.* (?) *borealis* from Cape Dorset, southwest Baffin Island, but obviously darker all over than six specimens (two broods) of *S.m. sedentaria* from James Bay.

Somateria spectabilis (Linnaeus), King Eider, *Kingalik*

The King Eider, which breeds throughout the arctic islands, is an abundant, well-distributed nesting bird in the low country along the south and west coasts of Banks Island and in the flat, broad valleys of the rivers, and probably throughout the interior wherever there are lakes. It is less plentiful along the northern coast, partly because of the lack of lakes, and partly perhaps because of the perpetual pack ice along the shores. It can be seen from the tables that in early July, 1953, there were more King Eiders on the land bordering the coast north of Storkerson Bay than to the south of it, but in August, 1952, the reverse was noted at sea, either because

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[1] Salomonsen (1950–1) says that the male *S.m. borealis* has a bright yellow or orange bill, and Schiøler (1926, pp. 185-186), that it is about as in *S.m.v. nigra*, which he describes as orange-yellow. Kortright (1943) describes the bill of the male *S.m.v. nigra* as bright orange to orange red, and that of *S.m. dresseri* as "variable from grey to green, in spring, orange yellow." Nevertheless, in the National Museum there are no *S.m. borealis* specimens and only one *S.m. dresseri* (an albino taken in Saguenay County, Quebec, in December) which match the yellow-brown bills of *S.m.v. nigra*. Perhaps there is more difference between the Pacific and Atlantic forms in the dried than in the fresh specimens.

[2] The most westerly record for the Northern Eider, *S.m. borealis*, appears to be from Cresswell Bay on the east side of Somerset Island (Shortt and Peters, 1942). The Pacific Eider has not been recorded in Canada east of Kugaryuak River, Coronation Gulf, although Salomonsen (1950–1) says that more than a dozen, not all typical (!), have been recorded in Greenland. Witherby *et al.* (1948) say that *S.m. mollissima* sometimes has a black V-shaped mark under the chin.

TABLE XI

Measurement of Adult *Somateria spectabilis*[1]

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Straightened wing					Straightened wing				
Banks Island	21	266-287	276.7 ± 1.0	4.8	1.7 ± .27	17	251-280	267.1 ± 1.7	6.8	2.6 ± .44
Prince Patrick I.	13	268-286	276.4 ± 1.5	5.4	1.9 ± .38	9	256-279	269.8 ± 2.3	7.0	2.6 ± .61
Baffin I., Hudson B., Baker L.	13	267-286	276.2 ± 1.5	5.5	2.0 ± .40	8	265-275	269.8 ± 1.4	3.9	1.4 ± .36
	Bill from extremity of lateral feathering					Exposed culmen				
Banks Island	21	38.8-43.8	42.03 ± .34	1.54	3.7 ± .57	15	30.1-34.7	32.40 ± .38	1.45	4.5 ± .82
Prince Patrick I.	12	39.9-44.4	41.92 ± .37	1.26	3.0 ± .61	9	30.5-34.5	32.16 ± .44	1.32	4.1 ± .97
Baffin I., Hudson B., Baker L.	13	37.3-44.5	41.46 ± .45	1.64	3.9 ± .77	9	31.0-34.5	32.94 ± .35	1.04	3.2 ± .75
	Tarsus					Tarsus				
Banks Island	21	45.4-50.0	47.90 ± .25	1.15	2.4 ± .37	17	43.7-49.5	47.14 ± .34	1.38	2.9 ± .50
Prince Patrick I.	13	46.2-49.4	48.07 ± .29	1.03	2.1 ± .42	9	43.4-51.0	46.67 ± .62	1.87	4.0 ± .95
Baffin I., Hudson B., Baker L.	13	45.7-49.8	47.91 ± .33	1.18	2.5 ± .48	9	44.2-47.8	46.14 ± .42	1.26	2.7 ± .64

Origin of specimens. *Banks Island:* All were from De Salis Bay, Sachs Harbour, and Cape Kellett, and taken between May 27 and August 30, but mostly in June and early July. *Prince Patrick Island:* All were taken at Mould Bay between June 18 and July 21. *Baffin Island, Hudson Bay, Baker Lake:* South Baffin Island, 6 ♂♂, 4 ♀♀; north Baffin Island, 1 ♀; west Hudson Bay, including Southampton Island, 7 ♂♂, 1 ♀; James Bay, 3 ♀♀; Baker Lake, 1 ♂ (This is an unusually short-billed bird. The next shortest in this group measured 40.1 mm.). Two specimens were undated; the remainder were taken between May 1 and August 27.

Measurements of smaller collections from the western Canadian Arctic other than Banks Island, 7 ♂♂, 5 ♀♀; from the Queen Elizabeth Islands other than Prince Patrick Island, 4 ♂♂, 6 ♀♀, correspond closely with those given in the table.

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[1] The two 2-year-old males mentioned in the text have been included in the Baffin Island, Hudson Bay group.

the pack ice, which lay along the northern part of the coast, made eiders more difficult to see, or because they had moved south to the open water. The estimated population for Banks Island and of the adjacent seas is 150,000.

Previous Records

Armstrong (1857, pp. 391, 522) records King Eiders on the west coast north of Storkerson Bay on August 19, 1851, and at Mercy Bay in 1852. In 1850, eiders, probably this species, were last seen near the Princess Royal Islands on September 23 (Osborn, 1856, p. 114). Ten adult males and seven females, now in the National Museum, were taken at Cape Kellett in 1915 and 1916 between June 20 and August 7 by P. Bernard, and an adult female and one unsexed juvenal by G. H. Wilkins on August 30, 1914. In 1949, Porsild (1951) saw several flocks of eiders, which he thought were this species, on both the east and west coasts of Banks Island.

Migration and Movements

In 1952, we first saw King Eiders at De Salis Bay on June 6, when 12 landed on a shallow lagoon near our camp. Between June 7 and 15, there were usually 15 to 40 there. On June 10, two flocks totalling 20 birds were seen for the first time flying inland, and on the same day a pair was observed on a lake. Two days later most of the lakes were occupied, and 70 King Eiders were seen in small groups or pairs during an eight-hour walk inland. However, between June 17 and 19, when we were walking down the Masik Valley, about 130 King Eiders, in flocks of 15 to 30, flew up the valley and apparently crossed the pass to De Salis Bay.

In 1953, the Eskimos told us that King Eiders first appeared at the floe opposite Sachs Harbour about April 10, and Höhn saw about 500 there during six visits between May 13 and June 5. On June 2, three flocks, all males and totalling 200, were seen for the first time flying over Cape Kellett. They were first noted near land at Sachs Harbour on June 7, on lakes near Cape Kellett on June 9, and on lakes south of Sachs Harbour on June 13. From then on they were abundant in both areas. The males leave the nesting females when the latter begin to incubate, and by the beginning of July, 1952, the proportion of males on lakes in the De Salis Bay region had been reduced. Along the west coast, where the season was very backward, the males still slightly outnumbered the females in early July, 1953, but there may have been additional concealed incubating females. Along the upper Bernard River, July 12, where the spring was distinctly more advanced, most of the eiders were females.

Seen from a distance, males in eclipse plumage cannot always be distinguished from females, but there can be no doubt that 70 per cent of the eiders seen from the canoe along the west coast in early August, 1952, were females. Where the males had gone is not known. Höhn's observation of a flock of 300 males about 2 miles off Sachs Harbour on July 29, 1953, suggests that they might be farther out to sea. However, very few ducks were seen by Manning and Macpherson far from land during the *Cancolim's* trip up the west coast of Banks Island and in other parts of Amundsen Gulf and the Beaufort Sea in the latter part of August and early September, 1951.

Breeding

King Eiders usually nest beside lakes, on small islands in lakes, or in low, marshy country, but occasionally on almost bare hillsides near coasts, rivers, or lakes. On June 21, 1952, two nests with two and three eggs respectively were found near Sachs Harbour; on July 17, two broods of about 8 downies each were seen in a lake just west of De Salis Bay. One brood was probably a week to 10 days old; the other, only a few days. On July 29, three females, probably of this species, were seen with about 20 young a little south of the Masik River.

In 1953, a nest with two eggs was found near Cape Kellett on June 19, and along the west coast between June 28 and July 9, 12 nests containing from one to six eggs. The larger clutches were usually slightly incubated, but on July 8, a female was shot with an egg still in the oviduct. A nest with five slightly incubated eggs was found near Bernard River on July 11. At Sachs Harbour, Höhn found nests on July 13 and 18 with three and four eggs respectively.

Predation and Possible Starvation

The Eskimos say they frequently see male King Eiders too weak to fly and attribute this to starvation. There may be some connection between this and the finding by Porsild (1951) of the picked carcasses of 16 King Eiders, all males, below the nest of a pair of Duck Hawks near Cape Lambton. Two apparently starving males were brought in to Höhn on June 10 and July 11 respectively. The latter was alive but died next day in spite of being fed fish.

Foxes presumably take a large toll of eggs and young, particularly after a lemming crash, and the scarcity of nesting eiders in late June and early July, 1952, at De Salis Bay may have been caused by foxes. The Eskimos collect a few eggs from the nests they happen to find near Sachs Harbour, but seldom bother to shoot the adult birds as they can get plenty of geese.

Specimens

Yearling specimens are scarce in the National Museum's arctic series, probably because non-breeding birds seldom visit the land. There are none from Banks Island, but three females of this age were taken on June 21, 1925, at Lake Nettilling[1], one from Camp Kungovik, Baffin Island (July 15, 1929), and one from Dundas Harbour, Devon Island (July 31, 1929), the last indicating that some young birds summer in the far north.

The gonads of 16 Banks Island specimens, taken between May 27 and July 4, were examined. All seemed to be in breeding condition. No female had a largest ovarian follicle smaller than 5 mm. Testis measurements (10 specimens, June 9-19) ranged from 19 mm. to 36 mm. (mean, 27.3 mm.) but did not appear to be correlated with the amount of white on the wing coverts, the variability of which was considerable, and, except for the Lake Nettilling specimen and another from Cape Fullerton, both probably two-year-old birds, almost equalled that of the remainder of the series examined.

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[1] These were from a flock of about seventy birds. A male taken from the same flock (Soper, 1928) is one of the two specimens seen that can, with fair certainty, be considered second-year birds.

The samples compared in Table XI show no significant differences in the measurements taken; neither could any constant colour difference be seen. The same is true for smaller collections from Ellesmere Island and the Dolphin and Union Strait region. A series of 37 small downy young from the western Arctic, Baffin Island, and Cape Henrietta Maria, Hudson Bay, was also examined. There was usually close agreement between individuals of one brood, but often considerable variation in the relative amount of black and brown tinging of the back between broods without reference to age or geography. Some of the less fresh specimens may have foxed slightly, but six taken on Victoria Island in 1920 still closely match our recent Banks Island downies. None showed the face and neck of the Southampton Island specimens illustrated by Sutton (1932, Plate XXII).

An adult female, collected at the floe near Sachs Harbour on May 27, weighed 1.8 kg. An apparently starving adult male, captured July 11 weighed 1.0 kg. when dead next day.

Somateria fischeri (Brandt), Spectacled Eider

On June 20, 1952, Manning and Macpherson obtained a good view of a male Spectacled Eider swimming with a pair of King Eiders on the Sachs River about 25 miles from its mouth. This appears to be the only Canadian record, and although it was not collected, there seems little chance of an error in the case of so distinctive a bird.

Buteo lagopus s. johannis (Gmelin), American Rough-legged Hawk
Kilrialuk

The number of nesting Rough-legged Hawks on Banks Island varies widely from year to year. In 1952, when the lemming population was at an extreme low, probably not more than a dozen pairs were nesting on the whole island. In 1953, with the lemmings on the increase, five Rough-legged Hawk's nests were found, and a further five suspected breeding pairs seen, but some apparently suitable areas were still unoccupied, and it was thought that if the lemmings reached a peak the following summer, the hawk population would be larger, perhaps reaching a maximum of 1,200 birds. Although lemmings were apparently scarce on Banks Island in 1949 (Porsild, 1950, p. 54), Porsild (1951) saw Rough-legged Hawks in flight at a number of places, and found a nest containing what looked like full-grown young on August 25 at Nelson Head. It is possible, therefore, that their extreme scarcity in 1952 was occasioned not only by scarcity of lemmings on Banks Island, but also by the relatively good feeding on the mainland, since Red-backed Mice were extremely abundant at Tuktoyaktuk, and a fair number of lemmings were seen on Baillie Island in the autumn. That Rough-legged Hawks may also breed on the islands north of Banks Island in good lemming years is shown by a nest found on Prince Patrick Island in 1949 by MacDonald (1954).

In 1952, the ground was still almost uniformly snow-covered when the first Rough-legged Hawks were seen at De Salis Bay on May 14. On June 10, a pair was seen flying about a nest on a 15-foot eroded sand pinnacle about 6 miles west of our camp. The nest contained no eggs but appeared to have been added to during the current season. No Rough-legged Hawks were seen in the De Salis Bay region after that date, and when we visited this nest again on July 1, it was deserted.

In 1953, the first Rough-legged Hawk was seen in the Sachs Harbour–Cape Kellett region on May 15. On May 19, one had apparently selected a nesting site on a small mud cliff near Mary Sachs. A pair was seen there on May 29, and an empty nest on July 15. On May 21, a pair was seen about 1½ miles west of Sachs Harbour, and on July 5, a nest containing four eggs was found there on the slope of the coastal ridge. On July 26, two nests containing half-grown young were found about 2 miles apart near Mahogany Point, and on August 8 another with four nearly full-grown young near Investigator Point.

The measurements of seven adult males and four probably adult females from the western Canadian Arctic (Mackenzie Delta to Coronation Gulf) are as follows: wing chord, ♂♂, 404.0 (395-410)mm., ♀♀, 426.5 (418-434)mm.; bill from cere, ♂♂, 22.0 (21.1-23.9)mm., ♀♀, 23.9 (22.6-25.0)mm. One Mackenzie Delta specimen (wing, 394 mm., bill 21.3 mm.), marked female, has been omitted as probably incorrectly sexed, although almost matched by the smallest wing measurement given by Friedmann (1950). It may also be mentioned that two immature birds from Franklin Bay, if correctly sexed as males, have wing measurements (437 mm. and 439 mm.) well above the range given by Friedmann for this race. However, there is no other indication that western Canadian Arctic specimens tend toward *B.l. kamtschatkensis*, and again, an error in sexing is probably involved. There are not sufficient properly sexed eastern specimens in the collection to make comparison of measurements worth while.

The adult and sub-adult males through their first summer can usually be separated with ease by the characters given by Friedmann (1950), but the adult females examined have less obvious banding on the tail and more tendency to retain the dark markings on the abdomen. Although adult males and females are described as alike by most authors, it appears easier to separate them than it does to separate adult from sub-adult females.

The only dark-phased specimens[1] out of a total of 36 Rough-legged Hawks in the National Museum are five from southern (in the broad sense) Quebec and Ontario, and we cannot recollect seeing any in the Canadian Arctic beyond the extreme limit of trees[2]. They are apparently not uncommon up to this limit in Ungava (Manning, 1949) and at Churchill (Taverner and Sutton, 1934). In a letter dated January 10, 1956, Mr. Cade says that there were no "extremely dark birds" in his Canadian series north of the vicinity of the tree-line, although amongst the Alaskan birds there were two black specimens from the Colville River region, where he had seen others in the field equally dark. Mr. Cade also mentioned that the dots on his distribution map were spaced to show up clearly and therefore represent only approximate positions. This explanation was deleted by the editors. He had no specimens from the west side of Melville Peninsula.

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[1] The National Museum series has been re-examined in the light of Cade's (1955) discovery that in a large series there is complete gradation between the colour phases. However, it still appears that five specimens are sharply differentiated from the remaining 31.

[2] Since this was written, Macpherson has seen three Rough-legged Hawks, which he believed to be in the dark phase, at Cape Dorset, south Baffin Island.

Falco rusticolus obsoletus Gmelin, American Gyrfalcon

The only known nesting site of the American Gyrfalcon on Banks Island is at Gyrfalcon Bluff, a prominent cliff about 2 miles inland from the southeast corner of Mercy Bay (Plate V A). Since Armstrong (1857, p. 426) saw several Gyrfalcons in the autumn of 1851 (including one shot near Ballast Beach on September 5) and in subsequent seasons at Mercy Bay, it is possible that this site was even then occupied, as it was in 1949 when Porsild (1951) saw a pair there, and below the nest found an emaciated, almost full-grown juvenal on August 24. The nest was seen on August 11, 1953, but could not be reached, nor could any young be seen in it. Two adults, which dived at Manning from the cliff, were collected, and may be assumed to have been a resident, if not then breeding, pair. The largest ovarian follicle of the female was .5 mm. Both birds were fairly fat, and their stomachs contained lemmings, which were rather plentiful in the area. The species seems to be fairly common in Ellesmere Island, but two seen at Resolute by Macpherson and S. D. MacDonald in late September, 1954, appear to be the only records in the Queen Elizabeth Islands west of there.

For the present, it seems wise to follow Todd and Friedmann (1947) and Friedmann (1950) in recognizing only one nearctic race of the Gyrfalcon, although the existence of a pronounced dimorph- or trimorph-ratio cline as outlined by Salomonsen (1950–1), possibly with complete segregation of white birds in the north and dark birds in the south (i.e. Labrador), must be admitted, and the lack of any sharp natural division between subspecies and colour phases recognized. In some ways, the situation resembles that in the Blue and Snow Geese, except that as yet there seems to be no evidence of non-random mating in the Gyrfalcons and less suggestion that their populations have ever been completely isolated genetically or geographically. Mixed pairs of white and dark birds have been recorded in Greenland (Salomonsen, 1950–1), and the Gyrfalcon Bluff pair was also mixed (Plate VIII).

Table XII shows the available specimens taken within the breeding range and divided into white and dark forms. If this is a random sample, it is quite clear that there is a pronounced difference in ratios of the two forms in Baffin and Ellesmere islands on the one hand, and the western Arctic, including Banks Island, on the other. The significance of this difference is represented by adjusted $\chi^2 = 7.4$. $P < .01$.

The only difference between the Siberian Gyrfalcon, *F.r. uralensis*, and the American race is the relative length of the first (outer) and fourth primaries (Friedmann, 1950). In *F.r. uralensis* the fourth primary is as long or longer than the first; in *F.r. rusticolus*, it is shorter. Some authorities (*See* Salomonsen, 1950–1, p. 448) have doubted the validity of this difference. No Siberian birds have been examined, but Table XIII shows that there is only a 10 per cent overlap in the relative lengths of these primaries between eastern and western Arctic birds, in spite of the first primary being longer than the fourth in all but one of the western series. This is a male taken in the Mackenzie Delta on September 18, 1934. It would therefore be legitimate to separate the eastern and western birds subspecifically and revive *F.r. alascanus*, were it not that the difference in primary length demonstrated in Table XIII is almost certainly a continuation of a cline from *F.r. uralensis*. Until some natural break or step in this cline can be demonstrated, it is convenient to continue to separate the races at the point of morphological difference used by Friedmann (1950) and quoted above.

Obviously, if the *obsoletus* and *candicans* forms were accepted as conventional subspecies as urged by Salomonsen (1950–1), their boundaries would cut across this east-west cline of relative primary length and its named subspecies, a difficulty which is not, however, confined to ratio clines.

TABLE XII

Division of Adult and Juvenal *F.r. obsoletus,* Taken within the Canadian Breeding Range, into White and Dark Forms

		White	Dark
Ellesmere Island	Sept. 4, summer	3	—
Baffin Island	Aug. 3–Sept. 6	8	1
Western Canadian Arctic mainland coast, south coast Victoria Island	Sept. 10–Jan. 21	2	6
Banks Island	Aug. 11-24	1	2

Friedmann's statement (1950) that two specimens from Fort Anderson are more like *F.r. uralensis* than *F.r. obsoletus* raises the possibility that the former race may breed in the western arctic islands. Now the fourth primary of the adult male from Gyrfalcon Bluff is 4 mm. longer than the first primary, while in the female the fourth is 42 mm. longer. However, although the outer primaries in both birds appear full-grown, they show the remains of sheaths. There can be little doubt, therefore, that the outer primary of the female at least has not attained full length. In the juvenal, the fourth primary is longer than the second and third, as well as the first, but in this case they are clearly not full-grown. They, like the above two Fort Anderson specimens, must therefore be assigned to the North American race on the basis of geographical probability, although additional specimens from the western islands are needed for proof.

The measurements of the two adults collected at Gyrfalcon Bluff are: wing chord, ♂, 354 mm., ♀, 384 mm.; bill from cere, ♂, 21.2 mm., ♀, 24.2 mm.; tarsus, ♂, 60 mm., ♀, 62.5 mm.

There are two winter western Arctic specimens: one, a white bird from southeast Victoria Island, taken January 21, 1918, and one, a dark bird from the Coppermine River, taken on March 28, 1927. The other western Arctic (other than Banks Island) specimens were collected between September 9 and 24, and may also have moved some distance from their breeding grounds. The fact that only one is white may indicate either that few breed in the northern part of the western arctic islands, or that even there the majority are dark. Five of the white Baffin Island birds were taken in Cumberland Sound, and three on the south coast: near Amadjuak, 2, and Cape Dorset, 1. The single dark Baffin Island specimen was a juvenal collected at Piling, northeast Foxe Basin, on September 3, 1949, and had probably been reared near there. At least four different white Gyrfalcons and one other dark one were seen in that region, as well as one dark bird at the Barrow River (Manning, 1950). This river is in central Melville Peninsula, which may be in or near the normal breeding range of the dark form. A few dark birds have also been recorded on the north, east, and south coasts of Baffin Island (Soper, 1928, 1946; Shortt and Peters, 1942).

TABLE XIII

Difference: 1st (outer)—4th Primary

	No.	Extremes	Mean	σ
Alaska, western Canadian Arctic...........	9	0-8	3.78 ± .79	2.35
Eastern Canadian Arctic, Greenland........	22	4-19	11.50 ± .81	3.79

Origin of specimens. *Alaska, western Canadian Arctic:* North coast of Alaska, 1 ♀; Mackenzie Delta, 1 ♂, 1 ♀; Cape Bathurst, 1 ♂, 1 ♀; Franklin Bay, 1 ♂; Dolphin and Union Strait, 1 ♀; Coppermine River (tree limit), 1 ♂; southeast Victoria Island, 1 sex ?. *Eastern Canadian Arctic, Greenland:* Ellesmere Island, 3 sex ?; Baffin Island, 2 ♀♀, 6 sex ?; Greenland, 2 ♂♂, 3 ♀♀, 6 sex ?.

Males, females, and full-grown subadults are included in this table. The Banks Island and three other specimens with remnants of sheaths on the outer primary have been excluded. No sheaths were found on any of the fourth primaries, but they are more difficult, and in some specimens impossible to see.

Falco peregrinus anatum Bonaparte, American Peregrine Falcon, *Kitigavik*

The Peregrine Falcon nests in suitable localities, including coastal mud cliffs, throughout southern Banks Island, and probably occasionally in the ravines which border the north coast. As yet there are no records for any of the Queen Elizabeth Islands (Cf. Shortt and Peters, 1942), although in Greenland it appears to breed in the southern parts of the Thule District (Salomonsen, 1950–1). Unlike the Rough-legged Hawk, the breeding population in Banks Island appears to be fairly constant from year to year, and the total population is estimated to be 600.

In 1949, Porsild (1951) found occupied nests at Cape Lambton, Nelson Head, and 40 miles south of Russell Point. At the last-named place, three full-grown young, barely able to fly, were seen on August 24. In 1952, we saw a pair on the mud cliffs some 20 miles east of Sachs Harbour on June 23, and on July 3 a pair appeared to be occupying a territory along the mud cliffs just east of De Salis Bay, but no nest was found and the birds were not seen again. On June 26, a nest containing four slightly incubated eggs was found about 25 miles inland on the south side of Masik Valley. The unusually large accumulation of nesting material indicated that this had been a nesting site for many years. On September 3, 1952, eight Peregrine Falcons, thought to be mostly young birds, were seen in the valley of the Muskox River. In 1953, a Peregrine Falcon was seen at a prominent bluff of the Cape Kellett cliffs on May 15, and four days later, two, also apparently claiming this nesting site. The nest was seen, but could not be reached on June 19, and the pair was collected. The stomachs of both contained the remains of lemmings.

Friedmann (1950) says that the Siberian race, which he refers to as *F.p. harterti*, differs from *F.p. anatum* in having a narrower malar stripe, which leaves a conspicuous white stripe, reaching to within about 20 mm. of the eye, between it and the dark dorsal surface of the neck. This description fits all the National Museum specimens from arctic Canada, except possibly one Banks Island female. The only southern Canadian adults in the National Museum are a male from the north shore of the St. Lawrence, another from Whitewater Lake, Manitoba, and a female from Red Deer, Alberta. These have distinctly broad malar stripes and lack pronounced white lines above them (Plate IX). If these characters hold for other southern breeding birds, as from Friedmann (1950) appears to be the case, it is clear that the northern Canadian population is separable from that breeding farther south and is presumably identical with that of northern Siberia. However, before changes in nomenclature are suggested, further investigation is necessary, particularly as *F.p. anatum* appears to have been based on a bird with a long, narrow, malar stripe (*See* Wilson and Ord, 1814, Plate 76).

It is interesting to note that Dementiev and Gladkov (1951) show *F.p. leucogenys*, with which they include *F.p. harterti*, as a tundra form, stretching across the northern palaearctic. If this population and that of the northern nearctic are inseparable, there would be a near circumpolar

TABLE XIV

Measurements of Adult *Falco peregrinus anatum*

	♂♂			♀♀		
	No.	Extremes	Mean	No.	Extremes	Mean
	Straightened wing			Straightened wing		
Alaska, western Canadian Arctic...	7	303-317	310.3	5	346-358	353.2
Eastern Canadian Arctic, Greenland	4	306-315	310.8	2	353-357	355.0
	Bill from cere			Bill from cere		
Alaska, western Canadian Arctic...	7	18.2-19.7	18.9	5	21.4-23.1	22.5
Eastern Canadian Arctic, Greenland	5	18.2-19.7	18.6	2	21.4-22.0	21.7
	Tarsus			Tarsus		
Alaska, western Canadian Arctic...	7	46.0-49.8	47.6	5	52.8-53.8	53.4
Eastern Canadian Arctic, Greenland	4	46.3-47.1	46.9	2	53.0-53.0	53.0

Origin of specimens. *Alaska, western Canadian Arctic:* North coast of Alaska, 1 ♂, 1 ♀; Banks Island, 2 ♂♂, 2 ♀♀; Victoria Island, 2 ♂♂; Coronation Gulf, 2 ♂♂, 2 ♀♀. *Eastern Canadian Arctic, Greenland:* Baffin Island, 3 ♂♂; Southampton Island, 1 ♀; central mainland (Hanbury River), 1 ♂; Greenland (Godthaab), 1 ♂, 1 ♀. All taken between June 6 and July 30 except one Baffin Island male dated 'summer'.

race inhabiting the northern tundra and separable from the more southern forms in both the palaearctic (Dementiev and Gladkov, 1951) and nearctic by the width of the malar stripe. The two southern forms may also belong to the same race (Dementiev and Gladkov, 1951). Salomonsen (1950–1) says that birds with both broad and narrow malar stripes are found in Greenland. Of the two National Museum specimens from Godthaab, one has a broad, the other a narrow, malar stripe.

The western nearctic males of the series studied average paler than eastern birds, the darkest of which was from the north shore of the Gulf of St. Lawrence. However, no difference could be seen in the smaller series of females, and no obvious difference in size (Table XIV).

Lagopus lagopus leucopterus Taverner, White-shafted Ptarmigan, *Achigik*

The White-shafted Ptarmigan probably nests throughout Banks Island, but, according to the Eskimos and our own observations, it is more common in summer on the low west and southwest sides of the island, and at De Salis Bay there appeared to be a distinct decrease in their numbers after the first few days of June. The total breeding population of Banks Island is estimated to be 20,000. The only White-shafted Ptarmigan recorded north of Banks Island were four seen by Macpherson (one shot but not preserved) at Ibbet Bay, Melville Island, on June 1, 1954.

Some White-shafted Ptarmigan probably remain throughout the winter on Banks Island. As shown by Table XV, ptarmigan were killed at Mercy Bay in winter, but the species are not distinguished, although Armstrong (1857, p. 521) mentions that both occurred at Mercy Bay, and at Prince of Wales Strait where 249 were killed (Armstrong, 1857, p. 601). That some White-shafted Ptarmigan also migrate to the mainland is shown by one killed by Manning (not preserved) at Baillie Island on September 25, 1952. Also, Taverner (1932) lists five White-shafted Ptarmigan, presumably Victoria Island migrants, from the south side of Dolphin and Union Strait. In 1914, Stefansson (1921, p. 238) saw about 100 Willow Ptarmigan on Norway and Bernard islands between June 25 and 30, and three males, one female, and one unsexed specimen were taken by the Canadian Arctic Expedition at Cape Kellett between June 23 and October 9 (Anderson, 1917).

A downy young collected on July 15, 1952, was not more than three days old. Both parents were very tame, and the female actually struck us with her wings when we picked up the young. The male had been seen at the same place on July 3, but a search had failed to reveal the female or the nest. Five of the seven females collected near Cape Kellett between June 6 and 12, 1953, had eggs in their oviducts. The other two, both taken on June 11, were probably still laying, and had nests with five and six eggs respectively. A nest found near Sachs Harbour on June 24, 1953, had 12 eggs. It is notable that up to June 14 the males seen at Cape Kellett had not greatly exceeded the females, although the former were usually seen first and the females had to be looked for, but between June 14 and 19, 22 males were seen, but no females, in spite of some prolonged searches. It is therefore thought that the males must either leave the females completely as soon as incubation begins, or at least keep well away from them. However, as soon as the young are hatched the males are again found with

TABLE XV

Number of Ptarmigan Shot at Mercy Bay by Officers and Crew of H.M.S. *Investigator* (Armstrong, 1857, p. 601)

	1851	1852	1853
January	—	13	10
February	—	15	10
March	—	10	4
April	—	14	6
May	—	99	—
June	—	36	—
July	—	40	—
August	—	31	—
September	—	19	—
October	42	11	—
November	2	16	—
December	2	9	—

the females and assist in the protection of the young. The pairs seen on our walk from Sachs Harbour to the Thomsen River did not appear to have nests, and it seems probable that their first attempt at nesting had been unsuccessful.

No White-shafted Ptarmigan were identified on the sledge journey from the Thomsen River to Sachs Harbour in early September, 1952, but it is possible that some ptarmigan seen in the distance and assumed to be Rock Ptarmigan were really this species.

Two females taken at Sachs Harbour on May 13 and June 5 weighed 713 gm. and 688 gm. respectively. A male taken on May 29 weighed 680 gm.

It is hoped that a detailed study of the collections will be possible at a later date.

Lagopus mutus rupestris (Gmelin), Rock Ptarmigan, *Achigik Niksatu-aluk*

Rock Ptarmigan have been recorded on Prince Patrick Island (MacDonald, 1954) and in the extreme north of Ellesmere Island (MacDonald, 1953). They probably nest throughout Banks Island but are more numerous during the breeding season in the moderately hilly country. Some presumably remain throughout the winter (*See* under Willow Ptarmigan), and they were plentiful both at De Salis Bay and Sachs Harbour when we arrived in mid-May. The total adult summer population on the island is estimated to be 25,000.

Rock Ptarmigan were shot both at Prince of Wales Strait and at Mercy Bay by M'Clure's expedition (*See* under Willow Ptarmigan for details). Stefansson (1921, p. 237) records one on Bernard Island on June 30, 1914, and three males and one female were collected at Cape Kellett by members of the Canadian Arctic Expedition between September 5 and 25 (Anderson, 1917). Porsild (1951) saw no ptarmigan on Banks Island in 1949, but on August 10, 1949, 25 miles west of Russell Point, J. L. Jenness saw a brood of young, presumed to be this species, still unable to fly (Porsild, 1951).

On May 10, 1952, the date of our arrival at De Salis Bay, eight Rock Ptarmigan were seen within half a mile of our camp, and tracks were more numerous than at any time thereafter. During May, the ptarmigan favoured the areas which were bare or partially bare of snow, and when these areas were covered after a snow storm, they seemed to disappear from the region. Possibly they came and went from inland ridges, or perhaps they migrated on toward the north, their place being taken by birds which crossed the ice from the mainland or from Victoria Island during spells of fine weather. After May 29, Rock Ptarmigan were usually in pairs, apparently occupying nesting territories. From June 10 to 16, we saw only males. Probably they were still in the vicinity of the nesting females, although several careful searches failed to locate either females or nests, which are harder to find than those of the Willow Ptarmigan. When we returned to De Salis Bay at the end of June, the males also had apparently vanished, and next year they disappeared from the Sachs Harbour region at about the same date. Whether they had actually moved to other feeding grounds and commenced to flock, or whether, having grown their summer plumage, they stayed quietly in hiding, was not determined. Both single males and pairs were still fairly plentiful along the west coast in early July, 1953, perhaps because of the late thaw in that area, which had prevented early nesting. Most of those seen between the mouth of the Bernard River and the Thomsen River were in small flocks. Between the Thomsen River and Storkerson Bay, September 2 to 10, 1952 (80 hrs.), we saw 66 ptarmigan in flocks of various sizes. Approximately half were not close enough for specific identification. The remainder were certainly Rock Ptarmigan. Between Storkerson Bay and Sachs Harbour, September 11 to 15 (40 hrs.), ptarmigan tracks were abundant along the banks of the rivers, particularly Big River. However, only one flock, consisting of about 40 Rock Ptarmigan, was actually seen. Apparently most of the ptarmigan had already moved down to the Cape Kellett region, where we found them in large and rather wild flocks on September 20, presumably gathering for the migration to the mainland. The flocks consisted largely of birds of the year, and amongst them were probably migrants from Prince Patrick and Melville islands, although in neither year did we see evidence of migrants arriving on northern Banks Island. The flocks seen on Russell Point and 15 miles south of there in 1953 were also principally birds of the year.

Ridgway and Friedmann (1946) are followed in referring birds from this area to *L.m. rupestris*. A more detailed study of the collection will be made later.

Two males collected at Sachs Harbour on May 14 and June 19 weighed 484 gm. and 485 gm. respectively; a female taken on June 7, 445 gm.

Grus canadensis canadensis (Linnaeus), Little Brown Crane, *Tadiiak* or *Tadigak*

The Little Brown Crane is a fairly common summer resident in many parts of Banks Island, although scarce or absent in others. The north coast records are the most northerly definite ones for the species, although at Winter Harbour, Melville Island, Oldenburg (1945) saw a footprint which her pilot, Ernie Boffa, said looked like that of a crane. In Banks Island the Little Brown Crane apparently favours the broad, flat valleys which have been cut through hilly country or are sheltered on the north by long scarps. It avoids most of the low, level western coast and the rolling hills of the eastern De Salis Bay region. Since it is one of the first birds to arrive in the spring, its choice of nesting territory may be governed by the availability of snow-free ground. Certainly the three areas where it was found most numerous coincided with the regions of early thaw. The snow always goes from the valley of the Sachs River, and probably from that of the Masik River, well before most other areas of Banks Island, and in 1953 the thaw must have been much earlier in the region of the upper Bernard, Muskox, and lower Thomsen rivers than it was farther south in the western part of Banks Island. The total population of Banks Island is estimated to be 3,000.

Migration

In 1852, Armstrong (1857, p. 522) observed the first crane at Mercy Bay in mid-May, although that was an exceptionally late spring, and one weighing 8 pounds was shot there on June 3. There does not appear to have been anyone at the northeast corner of Banks Island on May 20, 1915, when Walkinshaw (1949, p. 171), quoting a letter from R. M. Anderson, records a crane there. The record therefore probably refers to southwest, or possibly northwest, Banks Island, or possibly to another year. Anderson himself did not visit Banks Island.

In 1952, the first cranes, apparently a pair occupying a nesting territory, were seen on May 17 at the 'Sand Hills', which at that time formed an oasis of bare ground with pools of thaw water in the otherwise uniformly snow-covered country around De Salis Bay. They were still there on May 23 but had disappeared by mid-July. In 1953, the first crane was seen by an Eskimo at Sachs Harbour on May 12; three were seen near there by Höhn on May 15, and four by Manning at Cape Kellett next day. A few days later, Sparrow saw several in the valleys of the Muskox and Thomsen rivers, where bare ground was beginning to appear. Six of the eight seen at Cape Kellett between May 16 and 26 were flying in from the southwest, and apparently just arriving. On the north coast the last crane was seen in 1952 at Castel Bay on August 24, and in 1953, near Back Point on August 18. Four others were seen on September 1, 1953, on the east coast about 30 miles south of Russell Point.

Breeding

Most of the cranes seen in June, 1952, between the Masik Pass and Sachs Harbour, were in pairs and probably had nests. On June 21, a nest with two eggs was found on top of a sand hummock about 15 miles east of Sachs Harbour (Plate V B). Although there was little surrounding vegetation, the incubating parent was well camouflaged at a distance of 20 feet.

Another nest with two eggs was found on June 15, 1953, at the edge of a small valley near Sachs Harbour, but by the 18th it had been robbed, and broken egg shells were seen nearby. On July 18, a downy young, accompanied by its parent, was seen near the Kellett River. The 16 pairs seen between the Bernard and Thomsen rivers, principally on July 14 and 15 in the valley of the Thomsen and Muskox rivers, also probably had nests or young. The 36 seen on May 29 in a seven-hour walk between Mary Sachs and Sachs Harbour, and the 45 seen in or near the bed of Kellett River on June 15 or 16, were mostly in groups of three and four. The largest groups at each place were eight and seven respectively. It is thought that most were subadults or non-breeding adults.

Food

Cranes are predominantly vegetarian and insectivorous, though they occasionally eat mice and other small vertebrates (Walkinshaw, 1949; Bent, 1925). According to Armstrong (1857, p. 522), lemmings, which appear to have been numerous at Mercy Bay in 1853, constituted the principal food of the cranes, but whether this statement was the result of observation or inference is not clear. The stomachs of the specimens collected in 1953, when lemmings were moderately numerous, were either empty or contained only a small amount of unrecognizable vegetable matter; in 1952, lemmings were so scarce that it is unlikely that many could have been obtained, yet the number of cranes breeding appeared at least equal to 1953. In poor lemming years at any rate, roots must be the main source of food when the cranes first arrive, yet it is surprising that sufficient can be obtained under the wintry conditions that sometimes occur.

Specimens

Three (*See* Table XVI) of the five specimens collected in 1953 are thought to be adults. One, No. 39186, was a mated bird shot while "dancing". The flesh of No. 39183 was so tough that it could hardly be anything but an old bird. The third, No. 39184, agrees with the other two adults and differs from the two immatures (probably yearlings) in lacking retained juvenal Tawny feathers on the head or back of the neck and in having a more clear-cut dividing line between the bare frontal region and the feathered occiput. In the female subadult, the bare area above and behind the eye is narrower. No other differences between the adults and subadults can be seen except that the latter are acquiring, or have recently acquired, a considerable number of fresh grey body feathers. Walkinshaw (1949, p. 10) says that the primaries of the subadults are much darker than those of the adults. However, nearly black primaries are present in all the Banks Island specimens, except the supposed adult, No. 39184, and the subadult, No. 10116, in which they are Fuscous.

The five 1953 specimens are well matched in colour, the general impression of the back, because of the brown feather edging, being from Saccardo's Umber to Sepia. The new feathers of the subadults and the base of the feathers of the adults are Mouse Gray to Deep Mouse Gray, the neck and head, Deep Mouse Gray to Deep Neutral Gray with some whitish feathers on the throat and cheeks of some specimens, particularly No. 39184. No. 10116 is markedly paler than any of the 1953 specimens.

TABLE XVI

Measurements of Banks Island Specimens of *Grus canadensis canadensis*

Nat. Mus. No.	Place	Date	Sex and Age	Wing Chord	Culmen	Tarsus	Gonads
10116[1]	C. Kellett	June 17, 1915	♂ Imm.	417 mm.	92.2 mm.	162 mm.	
39186	C. Kellett	June 6, 1953	♂ Imm.	459 mm.	85.8 mm.	181 mm.	Testis, 32 mm.
—[2, 3]	Sachs Har.	May 18, 1953	—	—	—	—	3.6 kg.
39184	Sachs Har.	May 29, 1953	♀ Ad.	450 mm.	—	169 mm.	Largest "ovum", 20 mm.
39185	Sachs Har.	May 29, 1953	♀ Imm.	421 mm.	84.0 mm.	175 mm.	2.9 kg. "Ova" not enlarged
—[2]	Sachs Har.	June 8, 1953	♂ Imm.	452 mm.	88.0 mm.	186 mm.	3.6 kg. Testis, 25 x 9 mm.
39183	Thomsen R.	May 20, 1953	♀? Ad.	446 mm.	93.0 mm.	190 mm.	

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[1] Collected by P. Bernard.
[2] University of Alberta specimen.
[3] Skull only preserved.

Charadrius semipalmatus Bonaparte, Semipalmated Plover, *Tulik*

The Semipalmated Plover was unexpectedly scarce on Banks Island, and the total adult population was estimated at only 6,000. However, some undoubtedly breed in the southern part of the island at least. The three seen at Back Point on the north coast on August 15, 1953, appear to be a northern record for *C. semipalmatus*, although there is a male *C. hiaticula* in the National Museum taken on Ellesmere Island (Cf. Godfrey, 1953).

In 1952, the first Semipalmated Plover was seen at De Salis Bay on June 1 and, in 1953, at the Egg River on the same date. Next day, one was seen in display flight at the Kellett River. On June 24, 1952, an obviously nesting bird was observed near the south coast east of Sachs Harbour. On July 27, a nest with one recently hatched young and three eggs was found near the coast in Nelson Valley, and three other probable nesting pairs were seen in the same region. One downy young was seen near Kellett River on July 18, 1953.

Wynne-Edwards (1952b) has convincingly shown that at Clyde Inlet, where the ranges of *hiaticula* and *semipalmatus* overlap, the two forms do not interbreed. A similar inference may be drawn from the observations on the two species at Cumberland Sound made by Kumlien (1879). Lacking evidence of intergradation in other areas, the logical consequence, although apparently not accepted by Wynne-Edwards, is that the two forms must be considered distinct species in spite of their apparently rather small morphological differences and predominantly distinct ranges. His supposition, surely correct, that they were formerly completely allopatric and have come together as a result of post glacial extensions of their ranges, cannot affect this decision; neither can his more speculative, though not improbable, suggestion that failure to interbreed has been brought about by selection acting against the continuance of infertile mixed matings. The only explanation for failure to interbreed which would be consistent with conspecific status is that one or both forms arrive on the breeding grounds already mated. This possibility needs further investigation.

The National Museum's series of both species from Baffin Island confirms Wynne-Edwards' (1952b) observation that there is no sign of intergradation in the amount of webbing on the toes, and on that character alone any specimen can immediately be identified. In addition, it was noticed that whereas in the two Baffin Island, one Ellesmere Island, two Greenland, and one British specimens of *C. hiaticula* examined, there was a small (but variable) amount of white on the outer vane as well as on the shaft of the fourth primary from the outside, this was absent in all the Baffin Island specimens of *C. semipalmatus* as well as in a considerable number examined from other parts of eastern Canada. Thus in *C. hiaticula*, the fourth primary resembles the fifth primary of *C. semipalmatus*. Table XVII shows a slightly greater average wing length in the Baffin Island series of *C. semipalmatus* when compared with western material, but this need not be construed as an indication of intergradation with *C. hiaticula*, particularly as the same table also suggests that Baffin Island birds average shorter bills than those from the west, while the bill of *C. hiaticula* is certainly larger.

A male collected at Sachs Harbour on June 6 weighed 44 gm.

TABLE XVII

Measurements of Adult *Charadrius semipalmatus*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	CV.
	Wing chord					Wing chord				
Alaska, western Canada.........	15	114-128	117.67±.85	3.28	2.8±.51	10	113-124	119.80±.97	3.06	2.6±.57
Baffin Island..................	20	116-127	120.25±.70	3.11	2.6±.41	22	117-131	122.82±.77	3.61	2.9±.44
	Bill from posterior edge of nostril					Bill from posterior edge of nostril				
Alaska, western Canada.........	13	9.5-11.7	10.81±.15	.54	5.0±.99	9	10.4-11.6	10.91±.14	.42	3.9±.92
Baffin Island..................	17	9.7-11.4	10.64±.11	.47	4.4±.76	19	9.8-11.2	10.55±.09	.41	3.9±.63
	Tarsus					Tarsus				
Alaska, western Canada.........	15	23.0-25.6	24.21±.19	.75	3.1±.56	9	23.6-25.0	24.22±.16	.48	2.0±.47
Baffin Island..................	20	22.4-25.4	23.98±.20	.91	3.8±.60	22	22.8-25.1	23.83±.13	.60	2.5±.38

Origin of specimens. *Alaska, western Canada:* North coast of Alaska, 1 ♂, 2 ♀♀; British Columbia, 5 ♂♂, 5 ♀♀; Yukon Territory, 5 ♂♂, 1 ♀; Mackenzie Delta, 1 ♂; Banks Island, 1 ♂, 1 ♀; Dolphin and Union Strait, 2 ♂♂, 1 ♀. All taken between May 9 and Aug. 1. *Baffin Island:* Cape Dorset, 9 ♂♂, 9 ♀♀; Andrew Gordon Bay, 1 ♂, 1 ♀; Lake Harbour, 2 ♂♂, 5 ♀♀; Camp Kungovik, 1 ♂, 2 ♀♀; Lake Nettilling, 7 ♂♂, 5 ♀♀. All taken between June 1 and July 12.

Pluvialis dominica dominica (Müller), American Golden Plover, *Tulik*

The American Golden Plover is a fairly common and conspicuous nesting species in southern Banks Island, but none were identified[1] in 1952 or 1953 in the vicinity of the north coast, and in 1915, Stefansson (1921, p. 365) saw none until July 27, when he was probably a third of the way south across Banks Island from Mercy Bay. However, Armstrong (1857, p. 525) says that they were frequently shot at Mercy Bay in early June, 1852, and Sabine (1824, p. cxcix) reports that it breeds in considerable abundance in the swampy parts of the North Georgian Islands (*See* footnote, p. 25), and mentions that young birds were killed in the latter part of August and in September. At that time he was on Melville Island, and perhaps on Byam Martin Island (Parry, 1821). Fisher (1821, p. 225) records one killed near Liddon Gulf on June 13, 1820. However, there are no modern records for any of the Queen Elizabeth Islands. The total adult population of Banks Island is estimated to be 15,000, most of which probably nest.

TABLE XVIII

Measurement of Adult *Pluvialis dominica dominica*

	♂♂					♀♀		
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean
	Straightened wing					Straightened wing		
Western Canadian Arctic.........	15	173-187	179.80 ± 1.18	4.56	2.5 ± .46	7	175-182	177.4
Eastern Canadian Arctic.........	8	179-184	181.38 ± .50	1.41	0.8 ± .19	4	178-189	182.5
	Bill from posterior edge of nostril					Bill from posterior edge of nostril		
Western Canadian Arctic.........	12	19.3-20.9	20.16 ± .15	.51	2.5 ± .52	6	18.1-20.5	19.67
Eastern Canadian Arctic.........	8	19.4-21.5	20.59 ± .22	.63	3.0 ± .76	4	20.0-20.8	20.4
	Tarsus					Tarsus		
Western Canadian Arctic.........	15	39.9-45.7	42.84 ± .42	1.63	3.8 ± .69	7	41.1-42.3	41.79
Eastern Canadian Arctic.........	6	42.3-44.6	43.57 ± .35	0.85	2.0 ± .56	4	42.4-45.0	43.9

Origin of specimens. *Western Canadian Arctic:* Banks Island, 7 ♂♂, 4 ♀♀; Baillie Island, 1 ♂, 1 ♀; southeast Victoria Island, 1 ♂, 1 ♀; Dolphin and Union Strait, 6 ♂♂, 1 ♀. *Eastern Canadian Arctic:* Baffin Island, 4 ♂♂, 1 ♀; Southampton Island, 3 ♂♂, 2 ♀♀; Churchill, 1 ♂, 1 ♀. All taken between June 1 and July 31.

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[1] But see under Black-bellied Plover.

In 1952, Golden Plovers were first seen at De Salis Bay on June 1, when 19 were counted in ten hours. By June 4, most of them were in pairs and appeared to be occupying adjoining nesting territories, of which they were very jealous. However, much of the ground which they were on was almost bare of vegetation, and as the marshes and better vegetated country became clear of snow and drier, they moved into these areas, in general becoming scarcer. In 1953, the first Golden Plover was seen near Sachs Harbour by an Eskimo on May 18, and by Höhn on May 27. On May 29, Manning observed a feeding flock of 25 on the snow-free ground at Mary Sachs. The only two seen at Cape Kellett were recorded on June 3.

On June 3, 1952, a nest with four eggs was found at De Salis Bay. By June 15, this nest was deserted, the young presumably having hatched. In 1953, pairs were seen in the Sachs Harbour region behaving as if they had nests or young on June 25, July 11, and July 17.

The wing measurements given by Bailey (1948) for Alaskan specimens, (15 ♂♂, 177.5 (174-181) mm., and 11 ♀♀, 179.5 (176-187) mm.), are presumably chords. If 2 mm. are added to convert these to straightened wings, it will be seen that they average almost as large in the males, and distinctly larger in the females than western Canadian birds, and there is therefore apparently no cline across Alaska towards the small *fulva*, the relationship of which to the present form seems doubtful (Conover, 1945, p. 571). Eastern Canadian Golden Plovers apparently average larger in the three measurements taken (Table XVIII).

Two males collected at Sachs Harbour on June 6 and June 8 weighed 145 gm. and 140 gm. respectively.

Squatarola squatarola (Linnaeus), Black-bellied Plover, *Tulik*

In most areas of Banks Island the Black-bellied Plover outnumbers the Golden Plover. A possible exception is the eastern De Salis Bay region, and very likely the similar, comparatively dry barren country along the east coast north of there. Along the north coast of Banks Island, Black-bellied Plovers are apparently scarce. There is a probable record for Prince Patrick Island (MacDonald, 1954), and the National Museum has a female taken July 6, 1909, at Winter Harbour, Melville Island, where a flock was seen on that date (Hennessey, 1910). The total adult population of Banks Island is estimated to be 45,000, most of which probably nest.

It is possible that some of the Golden Plovers, which Armstrong (1857, p. 525) says were frequently shot at Mercy Bay in June, 1852, may have been this species. Three unsexed juveniles were taken at Cape Kellett between September 4 and 6, 1914, by G. H. Wilkins, and three males the following year (June 18, 19, July 4) by P. Bernard. Porsild (1951) saw a pair of Black-bellied Plovers several times between August 11 and 21, 1949, near his camp 25 miles west of Russell Point.

At De Salis Bay in 1952, two Black-bellied Plovers were seen at the end of May, and, like the Golden Plovers, they suddenly became common on June 1. They were more apt to be found in marshy areas than the Golden Plover and moved off the bare uplands more quickly. Most of those seen in 1952 at De Salis Bay between June 3 and July 7 were in pairs, and clearly nesting or preparing to nest. On June 21, a nest with four eggs was found about 8 miles east of Sachs Harbour, and most of the other Black-

TABLE XIX

Measurements of North American Adult *Squatarola squatarola*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
Straightened wing	28	181-202	188.11 ± .85	4.48	2.4 ± .32	24	179-198	189.04 ± .94	4.61	2.4 ± .35
Bill from posterior edge of nostril	29	24.5-28.3	26.10 ± .19	1.01	3.9 ± .51	23	23.8-27.3	25.67 ± .19	.93	3.6 ± .53
Tarsus	29	41.6-50.6	46.43 ± .37	2.01	4.3 ± .57	24	41.3-50.6	46.14 ± .36	1.75	3.8 ± .55

Origin of specimens. North coast of Alaska, 2 ♀♀; Yukon Territory, 1 ♂; Banks Island, 6 ♂♂, 2 ♀♀; Melville Island, 1 ♀; Victoria Island, 3 ♂♂; Dolphin and Union Strait, 4 ♂♂, 2 ♀♀; British Columbia, 1 ♂, 1 ♀; Alberta, 1 ♂, 1 ♀; Saskatchewan, 1 ♂, 1 ♀; Manitoba, 4 ♂♂, 5 ♀♀; Baffin Island, 4 ♂♂, 2 ♀♀; James Bay, 1 ♂, 1 ♀; southern Ontario, 2 ♀♀; north shore of Gulf of St. Lawrence, 1 ♂, 1 ♀; Nova Scotia, 2 ♂♂, 4 ♀♀. All specimens taken between May 27 and Sept. 27, mostly in June, July, and August.

bellied Plovers seen in that region were apparently nesting. The single north coast record was a juvenile seen at Mercy Bay on August 21, 1952. It could not be distinguished from a Golden Plover with certainty.

In 1953, the first Black-bellied Plover was seen at Cape Kellett on June 1, and on the same day 20 were recorded at the Egg River. About mid-June they rather suddenly left the barren areas at Cape Kellett and were afterward seldom seen except in the marshes. On June 17, 1953, Höhn found a nest with three eggs at Sachs Harbour. It had four eggs on June 18, and one egg had recently hatched on July 12, giving an incubation period of twenty-four days. The other eggs did not hatch.

Three controversial races of Black-bellied Plovers, breeding respectively in Europe, in Siberia and in extreme eastern Alaska, and in the remainder of arctic North America, and depending on differences in wing length for their validity, have been discussed by Peters (1934a), Low (1938), and Dementiev (1939). Peters concluded that the nearctic race, *S.s. cynosurae*, was not distinguishable from the typical form, and that the overlap between the latter and the Siberian race, *S.s. australis*, was too great for recognition of that also. Low demonstrated the small difference between European and Siberian birds, but Dementiev, though concurring for the present in considering *S. squatarola* monotypic, pointed out that breeding specimens indicated a more marked increase in wing length eastward from Europe across Siberia than was shown by Low's far eastern material, which consisted largely of migrants. Lacking specific statements to the contrary, it may be assumed that Peters measured wing chords, whereas Low and

TABLE XX

Comparison of Wing Measurements of *Squatarola squatarola*

	Europe			Siberia			North America		
Peters (1934)	(8)	189.8	191.8	(4)	196.1	198.1	(69)	187.3	189.3
Low (1938)	(21)	195.1	193.1		—		(10)	189.5	187.5
Dementiev (1939)	(11)	192.7	190.7	(23)	199.3	197.3		—	
National Museum specimens		—			—		(52)		188.6
Weighted means			192.2			197.4			188.9

Peters's North American series was made up of nine specimens taken between Point Barrow and Baffin, 40 from the eastern, and 20 from the western United States. Their age is not given. The three specimens from western Alaska (wing (chord ?), 192 mm., 200 mm., and 205 mm.), which he places with Siberian birds, have been omitted entirely from this table. Low's specimens here considered are all adults. Eight of his European birds are from Pechora in north Russia, and 13 are British migrants. Dementiev's specimens are all adult, mostly breeding birds. Eleven were taken in western, and 12 in eastern Siberia. The unadjusted average of the latter was 200.2 mm. The figures in brackets give the number of specimens measured, and the underlined figures, the unadjusted means, taken directly or calculated from the figures given by the authors. The figures not underlined have been adjusted where necessary, as explained in the text, to give the probable straightened wing measurements. Males and females are considered together, since Table XIX clearly shows there is no significant difference between the sexes (Cf. Dementiev, 1939).

Dementiev used flattened wings. As pointed out previously, the former may be affected by the make-up of the skin, the latter by the angle of the ruler. However, by adding 2 mm. to the wing chords and subtracting a like amount from the flattened wings, these measurements may, in this species, be equated approximately to the 'straightened wings' of Table XIX. The figures resulting from this adjustment are given in Table XX, where it can be seen that those of the different authors show reasonable agreement.

The resulting means may therefore be considered a fair estimate of the average wing lengths of *S. squatarola* in the three areas considered, though clearly less satisfactory than those from a similar number of birds measured by a single worker. If it be assumed that the standard deviation of the European and Siberian birds would not differ too greatly from that given in Table XIX for the North American series, (4.6 used), the joint non-overlap (*See* Mayr *et al.*, 1953) would be 82 per cent for Siberian birds compared with North American, 70 per cent for the Siberian–European comparison, and 64 per cent for the European–North American. Although these figures might permit the separation of the Siberian and North American populations, they do not justify the maintenance of three races. Unfortunately, it is the North American birds, which, on the wing length character, are closest to the typical European form and would have to be placed with it. On general geographical grounds and in view of the apparent uniformity of the North American population and of the cline across the palaearctic postulated by Dementiev (1939), such a division appears unnatural. It seems wisest therefore to consider *S. squatarola* a monotypic species until more evidence for division has been accumulated.

The means given by Peters (1934a) for eastern and western United States migrants indicate a slightly greater average wing length for the latter. The means for Canadian and (2) Alaskan specimens in the National Museum, divided into eastern and western groups at the longitude of the Manitoba–Saskatchewan boundary, are, western: 188.4 mm., eastern: 188.7 mm., thus indicating that, except perhaps for extreme western Alaska, there is no appreciable difference in wing length between the eastern and western nearctic populations. Neither was there any appreciable difference observed in bill and tarsus lengths when plotted in frequency tables.

A male collected at Sachs Harbour on June 7, 1953, weighed 190 gm.

Arenaria interpres morinella (Linnaeus), Ruddy Turnstone, *Teliguak*

The Ruddy Turnstone is fairly abundant in western Banks Island, but surprisingly scarce in the De Salis Bay region. There is no record for the north coast, and although common along the valley of Bernard River and its northwest tributary as far as the height of land, none were seen in the valleys of Muskox and Thomsen rivers. Sabine (1824) says that it breeds on the North Georgia Islands (*See* footnote, p. 25), a statement which probably refers to Winter Harbour, where the expedition spent the spring (Parry, 1821). The pair seen on June 19, 1954, at Wilkie Point, Prince Patrick Island, by Macpherson, appears to be the only modern record for the species from the Queen Elizabeth Islands west of Ellesmere Island, where only *A.i. interpres* has been found. The total adult population of Banks Island is estimated to be 35,000.

TABLE XXI

Measurements of Adult *Arenaria interpres morinella* and Adult *A.i. interpres*

	♂♂					♀♀		
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean
	Wing chord					Wing chord		
Alaska, western Canadian Arctic (*A.i. morinella*)	5	144-148	146.0	—	—	6	144-153	147.7
Baffin I., Southampton I. (*A.i. morinella*)	7	142-148	144.6	—	—	4	146-149	147.2
Ellesmere I. (*A.i. interpres*)	13	142-153	146.38±.98	3.52	2.4±.47	5	149-152	149.6
	Culmen from cere					Culmen from cere		
Alaska, western Canadian Arctic (*A.i. morinella*)	6	20.0-22.7	21.32	—	—	6	19.6-22.7	21.75
Baffin I., Southampton I. (*A.i. morinella*)	8	20.0-21.5	20.76	—	—	4	21.6-23.2	22.30
Ellesmere I. (*A.i. interpres*)	13	19.6-21.7	20.52±.17	.62	3.0±.60	5	19.8-22.2	21.40
	Tarsus					Tarsus		
Alaska, western Canadian Arctic (*A.i. morinella*)	6	26.8-27.5	27.17	—	—	6	26.3-27.7	27.11
Baffin I., Southampton I. (*A.i. morinella*)	8	25.3-26.8	26.22	—	—	4	25.7-28.0	26.82
Ellesmere I. (*A.i. interpres*)	13	25.4-27.2	26.39±.14	.51	1.9±.38	5	25.7-27.2	26.38

Origin of specimens. *Alaska, western Canadian Arctic:* north coast of Alaska, 1 ♂, 1 ♀; Eskimo Lakes, 1 ♀; Banks Island, 2 ♂♂, 3 ♀♀; Victoria Island, 3 ♂♂; Dolphin and Union Strait, 1 ♀. All taken between May 23 and August 15. *Baffin, Southampton islands:* south Baffin Island, 4 ♂♂, 2 ♀♀; Southampton Island, 4 ♂♂, 2 ♀♀. All taken between June 6 and July 27. *Ellesmere Island:* Alert region, 6 ♂♂, 2 ♀♀; Slidre Fjord, 7 ♂♂, 3 ♀♀. All taken between May 31 and July 29.

In 1953, the first turnstone was recorded at Mary Sachs on May 29. Twelve were seen flying over an entirely snow-covered area in the valley of the Lennie River on May 31, and 11 at the Egg River between May 31 and June 1. They were first seen at Cape Kellett on June 4, and at Sachs Harbour on June 8. At De Salis Bay, turnstones were recorded only on June 10, 1952, when a pair was seen in a marsh and a lone female with a fully shelled egg in its oviduct was collected. On July 30 to 31, 1952, three or four turnstones, including at least two juveniles, were frequently seen around the houses at Sachs Harbour, and in the following year, pairs, which behaved as if they had nests or young, were seen near there on July 12 and 18.

As Godfrey (1953) has pointed out, there can be no doubt that the Ellesmere Island population is referable to *A.i. interpres*, for, although the National Museum series shows little difference from *A.i. morinella* in size, and although there is some overlap in the coloration of the adults, particularly the females, the juveniles are remarkably darker than those taken farther south (Cf. Godfrey, 1953) including one from southwest Baffin Island and one from Lady Richardson Bay, Victoria Island, the latter being the only available specimen of this age from the western Arctic. There is no obvious colour difference between specimens from Baffin Island and other southeastern arctic islands and specimens from the western Canadian Arctic and Alaska, but Table XXI indicates that the average tarsus length of western birds may be greater than that of either race from the east. The difference is not well supported by west coast migrants (7 ♂♂, 26.7 mm., 4 ♀♀, 26.3 mm.), but these may have originated in Alaska, while in the small available series it is the western Canadian Arctic specimens which have the longest tarsi. No definite conclusion can be reached without more material.

Two males collected at Sachs Harbour on June 8 and 10 weighed 98 gm. and 100 gm. respectively.

Numenius phaeopus hudsonicus Latham, Hudsonian Curlew

It is quite possible that a few Hudsonian Curlews sometimes nest in the wide, flat valleys of Banks Island, and certainly they are regular wanderers to the island. On June 29, 1953, a curlew flew over when we were about 20 miles from the mouth of Lennie River, two were seen next day a little farther down the river, and two were seen on July 7, just north of Storkerson Bay. On July 10, two flocks of about ten each were feeding in a marshy area about 15 miles up the valley of the Bernard River. The Eskimos recalled seeing curlews almost every year in the Sachs Harbour area.

The two flocks seen near the Bernard River were a little north of the latitude of Arctic Bay, whence a specimen in the National Museum formed the previous most northerly Canadian record. In Greenland, a specimen has been taken at Robertson Bay, Thule district (Hørring and Salomonsen, 1941).

*__Erolia maritima__ (Brünnich), Purple Sandpiper

Armstrong (1857, p. 525) says that Purple Sandpipers were frequently shot at Mercy Bay in early July, 1852, a statement which has been made more acceptable by the collection of a specimen on Prince Patrick Island in 1949 (MacDonald, 1954). The A.O.U. (1931) and Hellmayr and Conover (1948) include Melville Island within the species range. This is presumably based on Ross (1835), who says it was numerous there on a former voyage, evidently referring to that of Parry (1821). However, Sabine (1824), who prepared the zoological report of that voyage, says the Purple Sandpiper "was not met with in the islands of the Polar Sea", although abundant on the coast of Davis Strait and Baffin Bay. It is evidently common on parts of Somerset Island (Ross, 1835; Shortt and Peters, 1942). In 1947, Duvall and Handley (1948) frequently observed Purple Sandpipers on Cornwallis Island, and on August 23, saw nine (two collected) immatures at Freeman's Cove, Bathurst Island.

Erolia melanotos (Vieillot), Pectoral Sandpiper

No Pectoral Sandpipers were identified in 1952, and it is thought that they must be scarce in the southeastern part of the island. In the west they were locally moderately common in 1953. Eight of the 13 seen between the Bernard and Thomsen rivers were in a small marsh in the valley of the Muskox River, where they appeared to be nesting. A single specimen taken on Prince Patrick Island in 1952 (MacDonald, 1954) seems to be the only Canadian record north of this. The total adult summer population of Banks Island is estimated to be 14,000.

Pectoral Sandpipers were first seen at Sachs Harbour on May 26, when two were recorded. At Cape Kellett, none were seen until June 2. Then small flocks suddenly became numerous, and 150 birds were seen in three hours. Next day they had left, and only four were seen in the same period. After that they were confined to the marshes. In mid-June when the males were doing their characteristic display, several pairs were seen near the mouth of Kellett River. A female shot (but not preserved) on July 3 between the lower Lennie and Kellett river valleys had well-developed incubating patches.

There are no adult Pectoral Sandpipers in the National Museum from Baffin Island, where they are apparently very scarce (Soper, 1946), and only one (a female from James Bay) from the Labrador Peninsula, although they are rather commoner there (Manning, 1949). The western Arctic and Alaska specimens have therefore been compared with birds from James Bay, chiefly from Cape Henrietta Maria, and from southern Hudson Bay west to Little Cape. Table XXII shows that the western males average 3.76 mm. less in wing chord. This difference is significant ($t = 3.9, < P\ .01$) and in the available series permits a theoretic separation of about 80 per cent, using Table XII of Mayr *et al.* (1953). However, the samples are too small for confidence that this figure will be maintained with additional material, particularly as no significant differences are shown by the females. Some of the southern Hudson Bay and James Bay birds probably nested locally, but most were thought to be migrants (Manning, 1952). It is surprising, therefore, that five specimens from Churchill (wing chord 135.8(134-138) mm.) fit best in the western series, and only one (wing chord 142 mm.) in the eastern.

TABLE XXII

Measurements of Adult *Erolia melanotos*

	♂♂					♀♀		
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean
	Wing chord					Wing chord		
Alaska, western Canadian Arctic	14	133-139	136.14 ± .51	1.92	1.4 ± .27	4	119-130	124.7
Southern Hudson Bay, James Bay	10	135-144	139.90 ± .77	2.43	1.7 ± .39	4	121-127	125.2
	Bill from posterior edge of nostril					Bill from posterior edge of nostril		
Alaska, western Canadian Arctic	6	26.0-28.9	27.25	—	—	4	24.6-26.4	25.42
Southern Hudson Bay, James Bay	9	24.5-28.6	26.63 ± .41	1.24	4.7 ± 1.10	4	24.3-25.3	24.67
	Tarsus					Tarsus		
Alaska, western Canadian Arctic	6	28.2-29.4	28.90	—	—	4	27.2-28.0	27.52
Southern Hudson Bay, James Bay	10	27.6-31.8	29.39 ± .35	1.09	3.7 ± .83	4	26.3-28.5	27.47

Origin of specimens. *Alaska, western Canadian Arctic:* north coast of Alaska, 9 ♂♂, 1 ♀ (including 7 ♂♂ in the American Museum of Natural History. Wing measurements only); Franklin Bay, 1 ♂ (A.M.N.H.); Banks Island, 4 ♂♂, 2 ♀♀; Bathurst Inlet, 1 ♀. All taken between May 30 and June 20, except one undated. *Southern Hudson Bay and James Bay:* Little Cape, 5 ♂♂, 2 ♀♀; Cape Henrietta Maria, 4 ♂♂, 1 ♀; James Bay, 1 ♂, 1 ♀. All taken between July 17 and August 15.

TABLE XXIII

Measurements of Adult *Erolia fuscicollis*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
Alaska, western Canadian Arctic. .	7	116-125	119.6	—	—	3	119-123	121.8	—	—
Baffin Island.	22	116-123	119.09 ± .40	1.85	1.6 ± .24	13	118-126	122.77 ± .74	2.66	2.2 ± .43
	Bill from posterior edge of nostril					Bill from posterior edge of nostril				
Alaska, western Canadian Arctic. .	6	19.1-22.3	20.75	—	—	3	21.1-22.3	21.7	—	—
Baffin Island.	21	19.1-21.9	20.54 ± .17	.78	3.8 ± .59	13	20.5-23.5	22.10 ± .25	.88	4.0 ± .78
	Tarsus					Tarsus				
Alaska, western Canadian Arctic. .	7	23.3-26.0	24.88 ± .37	.97	3.9 ± 1.05	3	24.6-25.7	25.0	—	—
Baffin Island.	22	22.8-25.5	24.14 ± .16	.75	3.1 ± .47	13	24.0-26.4	25.08 ± .16	.58	.23 ± .45

Origin of specimens. *Alaska, western Canadian Arctic:* north coast of Alaska, 3 ♂♂ (2 A.M.N.H. specimens); Banks Island, 4 ♂♂, 1 ♀; Dolphin and Union Strait, 1 ♀; southeast Victoria Island, 1 ♀. All taken between May 31 and June 24. *Baffin Island:* Camp Kungovik, 12 ♂♂, 3 ♀♀; Lake Nettilling, 10 ♂♂, 10 ♀♀. All taken between June 4 and July 12.

Erolia fuscicollis (Vieillot), White-rumped Sandpiper

Scattered pairs of White-rumped Sandpipers evidently nest throughout the western lowlands, and probably in all the wide, flat valleys of the rivers flowing down to the west coast, but they appear to be common only in the southwestern part of the island. In 1952, only one was identified. It was seen at Castel Bay on August 19. In 1953, migrants in small flocks were fairly plentiful on the mud flats near Back Point in mid-August. Some of these may have come from Melville Island, since Hennessey (1910) found it breeding at Winter Harbour. However, there is only one record from Prince Patrick Island (MacDonald, 1954). The total adult summer population on Banks Island is estimated to be 25,000.

In 1953, the first White-rumped Sandpiper was seen at the Egg River on June 1, and at Cape Kellett on June 2. On July 3, a nest with four eggs was found just north of the Big River.

The tarsi of the small western Canadian Arctic and Alaska male series examined average .74 mm. larger than those of Baffin Island specimens, a difference which may be significant ($t = 2.0$, P about .05), although not supported by the smaller female samples.

A male collected at the Egg River on June 1 weighed 42 gm.

Erolia bairdii (Coues), Baird's Sandpiper

Although nowhere very plentiful, Baird's Sandpiper probably nests in suitable localities throughout Banks Island (Plate VI A), and the total adult summer population is estimated to be 25,000.

MacDonald (1954) and Macpherson recorded it as a regular summer resident of Prince Patrick Island, and Hennessey (1910) noted it breeding on Melville Island. A considerable number of migrants probably pass across Banks Island, although no obvious migrant flocks were seen on the north coast.

Between August 11 and 15, 1949, Porsild (1951) noted a few adults near his camp, 25 miles west of Russell Point. In 1952, the species was first seen at De Salis Bay on June 5. In 1953, one was seen near Mary Sachs on May 21, but they did not become common until ten days later. On June 1 and 2, 1953, several small flocks of migrants totalling 100 birds were seen feeding on patches of snow-free ground near Cape Kellett.

Four apparent nesting pairs were seen between Raddi Lake and Sachs Harbour, June 20 to 24, 1952. In 1953, other nesting birds were noted near Sachs Harbour in June and July, and also in the latter month in the valleys of the Bernard, Thomsen, and Muskox rivers, as well as between Castel and Mercy bays. On July 10, a nest with four eggs was found about 8 miles from the mouth of the Bernard River, and on July 21, two young just able to fly were seen near Mahogany Point. The adults, which had been seen scattered over the tundra in this area during July, had all vanished by the beginning of August.

Both sexes of the small series available from Baffin Island have a slightly greater average wing length than Banks Island and other western birds (Table XXIV).

A male collected at Sachs Harbour on July 17 weighed 40 gm.

TABLE XXIV

Measurement of Adult *Erolia bairdii*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
Alaska, western Canadian Arctic..	17	116-125	119.41 ± .55	2.25	1.9 ± .32	11	119-128	122.00 ± .79	2.59	2.1 ± .45
Baffin Island..................	6	116-124	121.2	—	—	6	123-127	125.7	—	—
	Bill from anterior[1] edge of nostril					Bill from anterior[1] edge of nostril				
Alaska, western Canadian Arctic..	15	17.0-20.2	18.90 ± .22	.84	4.4 ± .81	10	18.2-20.9	19.59 ± .25	.79	4.1 ± .91
Baffin Island..................	6	18.0-19.8	18.83	—	—	6	17.4-21.4	19.71	—	—
	Tarsus					Tarsus				
Alaska, western Canadian Arctic..	16	21.4-24.1	22.75 ± .19	.77	3.4 ± .60	10	21.5-23.5	22.52 ± .19	.60	2.7 ± .60
Baffin Island..................	6	22.2-24.3	22.95	—	—	6	21.6-23.8	22.50	—	—

Origin of specimens. *Alaska, western Canadian Arctic:* north coast of Alaska, 2 ♂♂, 3 ♀♀; Banks Island, 3 ♂♂, 2 ♀♀; Prince Patrick Island, 5 ♂♂, 6 ♀♀; Melville Island, 1 ♂; Victoria Island (Walker Bay), 1 ♂; Dolphin and Union Strait, 4 ♂♂; Bathurst Inlet, 1 ♂. All taken between May 31 and August 4. *Baffin Island:* 4 ♂♂, 3 ♀♀; Lake Nettilling, 1 ♂, 3 ♀♀; Pond Inlet, 1 ♂. All taken between June 4 and July 12.

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[1] In the sandpipers the posterior edge of the nostril is probably a better point from which to measure if it has not been damaged in too many specimens.

***Erolia alpina arcticola** Todd, Red-backed Sandpiper

A single sandpiper, thought to be this species, was seen flying at De Salis Bay on June 4, 1952. The nearest certain record is a female and downy young in the National Museum taken on Baillie Island. According to Sabine (1824, p. cc), the species is rare "in the islands of the Polar Sea", but this should not necessarily be interpreted as a record for Melville Island, as Preble (1908, p. 323) seems to suggest.

Todd (1953) says that *E.a. hudsonia* 'presumably' breeds east along the arctic coast from the Mackenzie Delta. However, the bill measurement of the single Baillie Island female (wing chord, 122 mm.; culmen, 37.0 mm.; tarsus, 25.3 mm.), the only western Canadian Arctic adult available, certainly tallies better with those he gives for *E.a. arcticola.*

Ereunetes pusillus pusillus (Linnaeus), Western Semipalmated Sandpiper, *Livilivilaluk**

Although never abundant, the Western Semipalmated Sandpiper is a moderately common nesting bird throughout Banks Island, and the total adult summer population is estimated to be 70,000. It is therefore surprising that as yet there appears to be no record from the Queen Elizabeth Islands, and those seen on the north coast of Banks Island form a northern record for the species.

In 1952, the first Western Semipalmated Sandpiper was recorded at De Salis Bay on June 2, and most of those seen after June 7 were paired and appeared to be nesting or preparing to nest. One nest with four eggs was found 10 miles east of Sachs Harbour on June 21, and another at De Salis Bay on July 3. In the following year, a flock of 10 sandpipers believed to be this species was seen at Cape Kellett on May 28, but none were identified with certainty until June 3, after which they gradually became commoner in the marshes without any migrant flocks being noticed. Ten were seen at the Egg River on June 1, but none at Sachs Harbour until June 13. Their apparent scarcity along the west coast at the beginning of July is rather surprising. However, on our long walk north, we naturally avoided the wetter marshes which they favour. Allowance for this has been made in estimating the total population.

Table XXV shows that the bills of eastern birds, including breeding specimens from Baffin Island, probably mixed breeding and migrant specimens from James Bay, and migrants from southeast Quebec and the Maritimes, are distinctly longer and narrower than those of birds breeding in Alaska and the western Canadian Arctic eastward to Bathurst Inlet. By calculating the coefficient of difference, and using Table 12 of Mayr *et al.* (1953), it was found that on culmen length alone, 88 per cent of males and 87 per cent of females in these populations are theoretically separable. By bill width, 94 per cent of the males and 89 per cent of the females can be separated. There is a considerable average difference in bill size between the sexes, but a frequency table indicated negligible difference in the ratio of culmen to bill width. For comparisons involving this ratio, males and females have therefore been grouped together, a great advantage, as unsexed specimens may be included. Taking the dividing line at the decimal ratio 10.5, it was found that only four out of the 92 specimens considered in the two series overlapped. The theoretical percentage separable was 95. The difference between the series is therefore clearly of subspecific order.

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*This name also used for other small sandpipers.

Tringa pusilla Linnaeus (1766, p. 252) was based on "La Petite Alouette-de-mer de S. Domingue" of Brisson (1760, p. 222). According to Hellmayr and Conover (1948), Brisson's 'type' was in the Réamur collection, most of which M. Christian Jouanin, of the Muséum National d'Histoire Naturelle, Paris, says must be considered lost (letter dated October 27, 1955). Brisson gives the length of bill from its tip to the corner of the mouth as $9\frac{1}{2}$ lines (=20.1 mm.). On his drawing (pl. 25, fig. 2) the bill from tip to corner of mouth measures 19.5 mm., and the exposed culmen, 17.8 mm. The position of the corner of the mouth is not easily determined in dried specimens. In some dried skins it appears shorter, and in some, longer. However, it was presumably a dried skin which Brisson used for his measurement. Therefore it seemed best to obtain the probable culmen length of his specimen by multiplying his measurement of 20.1 mm. by the ratio of exposed culmen/bill from tip to corner of mouth as measured on his plate. The result is $\frac{20.1 \times 17.8}{19.5} = 18.3$ mm. Since no sex is given and the bill width cannot be measured on the plate, certain identification is impossible, but as 18.3 mm. is closer to the figures for western birds given in Table XXV, that race is considered the typical form. Both races probably pass through, or winter in, the West Indies. Certainly the western race occurs there as the culmen/bill width ratios of three out of four West Indies specimens (mean, 10.00 (9.1–10.8) mm.) in the British Museum fall outside the range given in Table XXV for the eastern form. Seven British Museum specimens from British Guiana and Brazil (Bahia) are referable to both races (mean culmen/bill width ratio, 10.94 (8.6–14.2) mm.).

Between the proximal extremities of the two series used in Table XXV there is almost 1,000 miles of breeding territory, ample distance for a continuous cline to bridge the difference in bill ratios. The culmen/bill-width ratios of the only two specimens (north of Churchill) seen from this area, both collected at Chesterfield on the Hudson Bay coast on July 6 and 8 respectively, were 10.2 and 9.7. They are therefore referable to the western race. However, Sutton (1932) gives the culmen measurements of 10 Southampton Island males as 19.6 (18.5–21) mm., and of three females as 22.2 (22-22.5) mm. Reference to Table XXV shows that these measurements, if taken in the same manner as ours, are typical of the eastern race. There may therefore be a fairly sharp division between the Southampton Island and the mainland populations[1], a hypothesis which is supported by

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[1] Since this was written, seven Southampton Island males and four females, all in the British Museum, have been measured with the following results: exposed culmen, 7 ♂♂, 18.63 (17.7-19.7) mm.; 4 ♀♀, 20.6 (19.5-21.9) mm.; bill width, 7 ♂♂, 1.71 (1.6-1.85) mm.; 4 ♀♀, 1.78 (1.7-1.85) mm. The mean ratio of the 7 ♂♂+4 ♀♀ is 11.15±.26, which, although significantly smaller ($t=2.4$, P about .02) than the eastern race, is much closer to it than to *E.p. pusillus.*

TABLE XXV

Measurements of Adult *Ereunetes pusillus* subspp.

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
Alaska, western Canadian Arctic..	8	89.0-95.5	92.44±.75	2.13	2.3±.58	12	91.0-98.4	95.33±.62	2.16	2.3±.46
Eastern Canada................	29	90.0-97.8	93.83±.35	1.88	2.0±.26	26	93.9-99.7	96.89±.35	1.76	1.8±.25
	Exposed culmen					Exposed culmen				
Alaska, western Canadian Arctic..	15	15.7-18.9	17.45±.29	1.02	6.4±1.17	13	17.9-20.4	19.07±.22	.78	4.1±.80
Eastern Canada................	30	18.1-21.2	19.63±.16	.85	4.3±.56	26	19.5-22.9	21.08±.19	.99	4.7±.65
	Bill width					Bill width				
Alaska, western Canadian Arctic..	15	1.70-2.15	1.923±.027	.105	5.4±.99	13	1.85-2.25	2.100±.034	.124	5.9±1.16
Eastern Canada................	30	1.40-2.00	1.668±.019	.102	6.1±.79	26	1.60-1.90	1.769±.016	.081	4.6±.64
	Tarsus					Tarsus				
Alaska, western Canadian Arctic..	7	19.9-21.9	20.79±.25	.67	3.2±.87	12	21.9-23.5	22.62±.12	.42	1.8±.38
Eastern Canada................	29	19.5-23.4	21.17±.14	.74	3.5±.46	26	21.0-24.0	22.10±.14	.69	3.1±.43
	Culmen/bill width ♂♂+♀♀									
Alaska, western Canadian Arctic..	31	7.9-10.9	9.13±.12	.69	—					
Eastern Canada................	61	10.3-14.4	11.84±.12	.89	—					

Origin of specimens. *Alaska, western Canadian Arctic:* western Alaska, 2 ♂♂; north coast of Alaska, 2 ♂♂, 6 ♀♀; Mackenzie Delta, 1 ♂; Baillie Island, 2 ♀♀; Banks Island, 6 ♂♂, 5 ♀♀; Coronation Gulf, 3 ♂♂, 1 ♀; Bathurst Inlet, 1 ♂; Great Bear Lake, 1 ♂; Plover Lake, 1 ♂ (6 from Alaska and 3 from Coronation Gulf are A.M.N.H. specimens, and their bill measurements only were taken). All specimens were collected between May 31 and July 28. *Eastern Canada:* south Baffin Island, 10 ♂♂, 5 ♀♀; James Bay, 10 ♂♂, 8 ♀♀; Ungava Bay, 1 ♂, 2 ♀♀; southern Quebec (Gulf of St. Lawrence), 5 ♂♂, 5 ♀♀; Nova Scotia, 3 ♂♂, 1 ♀; New Brunswick, 5 ♂♂, 5 ♀♀. All taken between June 4 and August 29; mostly in June and July.

migrant specimens from Manitoba and southern Ontario, since these, though predominantly referable to the western race, include a few birds with distinctly longer, narrower bills, which surely belong to the eastern. Furthermore, after these obviously eastern birds have been eliminated as in Table XXVI, the culmen/bill-width ratio of the remainder, though greater than the mean of the aggregate of western birds in Table XXV and of the Alberta and Saskatchewan migrants in Table XXVI, is very close to that of the 17 Banks Island and central and eastern Mackenzie district birds; whereas the 14 Alaskan, Mackenzie Delta, Cape Bathurst specimens form another uniform group with a distinctly smaller mean culmen/bill-width ratio (*See* Table XXVI).

TABLE XXVI

***Ereunetes pusillus* subspp. Ratio, Exposed Culmen/Bill Width**

	Western Race			Eastern Race
	No.	Extremes	Mean	Individual specimens
Alberta	8	8.0-10.2	9.02	—
Saskatchewan	10	8.2-10.2	9.02	—
Manitoba	15	9.0-10.5	9.79	11.8, 12.1, 12.5
Southern Ontario	5	8.6-10.7	9.6	12.0, 12.2, 12.4
Banks I., central and eastern Mackenzie District	17	7.9[1]-10.9	9.54	—
Alaska, Mackenzie Delta, C. Bathurst	14	8.1-9.3	8.64	—

Manitoba specimens of the western race include two Churchill birds (ratios 10.4, 9.5) taken June 3 and August 1. The others are from Shoal Lake (eight specimens), Oak Lake (two specimens), Whitewater Lake (one specimen), The Pas (one specimen), Bird (one specimen). Of the three belonging to the eastern race, two (ratios, 12.5, 12.1) were taken at Churchill on June 5 and 11, and the other at Shoal Lake, May 28. Southern Ontario specimens were from Point Pelee (6), and Rondeau (2).

There is therefore reason to think that there may be three fairly distinct and constant populations: one, breeding in Baffin Island, James Bay, Southampton Island, and perhaps Melville Peninsula; a second, covering the Canadian mainland west nearly to the Mackenzie Delta and the arctic islands west of Melville Peninsula; and a third, occupying Alaska, the Mackenzie Delta, and perhaps the country east to Cape Bathurst. Naturally these divisions are speculative, and until more breeding material from Keewatin and the Mackenzie Delta is available, the existence of a single continuous or slightly stepped cline cannot definitely be ruled out. It is therefore advisable for the moment to use two names only: one covering the eastern population as outlined above, and the other the central and western. Migrants with a culmen/bill-width ratio of under 10.5 probably belong to the western species, whereas those over that figure should be referred to the eastern.

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[1] Next smallest, 9.1.

One complication has so far been ignored. Eleven American Museum of Natural History specimens, taken at Tadoussac, Quebec, between July 26 and August 14, 1889, have a mean culmen/bill-width ratio of 9.75 (9.3-10.2) and are therefore clearly referable to the western race. One taken at the same time is a typical eastern bird (ratio, 11.7). No explanation can be offered for this pocket of apparent western and presumably migrant birds so far to the east, but it seemed justifiable to omit all the 12 Tadoussac specimens from the eastern Canadian series of Table XXVI. Obviously it is desirable for another collection to be obtained from the area.

A male collected at the Egg River on June 1 weighed 24 gm.

Tryngites subruficollis (Vieillot), Buff-breasted Sandpiper

The Buff-breasted Sandpiper is rather rare on Banks Island, and none were seen north of the valley of Bernard River. However, widely scattered pairs probably nest in suitable localities throughout the island, although none were actually seen during the height of the breeding season and the only actual evidence of nesting is a young bird with a little down still adhering to its neck seen and collected 10 miles north of the Adam River on August 9. Two pairs have even been recorded as far north as Winter Harbour on Melville Island where Hennessey (1910) thought it nested, and Duvall and Handley (1948) took a juvenal, with down still adhering to the head, which came aboard the ship during a snow storm off Cape Cockburn, Bathurst Island, on August 27, 1947. The total adult summer population of Banks Island is estimated to be 2,000.

In 1952, Buff-breasted Sandpipers were seen at De Salis Bay between June 4 and 8 only. In 1953, 10 were seen near Sachs Harbour and one at Cape Kellett on May 27, and on May 29, 25 in one flock at Mary Sachs. They were not seen in this area after June 4.

In the small series available, no constant difference in colour or size could be detected between the Banks Island and other western Arctic specimens and those from Manitoba. They have therefore been grouped together in Table XXVII, and it will be noted that the coefficients of variation are small. There is apparently little or no overlap in size between the sexes.

A female collected at Sachs Harbour on May 27, 1953, weighed 74 gm.

TABLE XXVII

Measurements of Adult *Tryngites subruficollis*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
Wing chord....................	11	128-135	131.27±.67	2.22	1.7±.37	10	120-127	123.8±.63	2.0	1.6±.36
Exposed culmen................	10	19.2-20.3	19.66±.11	.36	1.8±.41	10	17.6-18.7	18.20±.11	.34	1.9±.42
Tarsus........................	10	31.3-34.6	33.43±.30	.94	2.8±.63	10	29.1-31.0	30.18±.18	.57	1.9±.43

Origin of specimens. Banks Island, 3 ♂♂, 3 ♀♀; Dolphin and Union Strait, 1 ♂; Manitoba (Whitewater Lake), 2 ♂♂, (Churchill), 5 ♂♂, 7 ♀♀. All specimens taken between May 13 and August 21.

Crocethia alba Pallas, Sanderling

The Sanderling is abundant in spring and autumn in southwestern Banks Island where it far outnumbers the aggregate of other shore birds. A large number may be migrants which nest on the islands to the north (*See* MacDonald, 1954), but a fair number of pairs certainly remain and nest in suitable localities throughout Banks Island, though principally on the western side. From records obtained after the main spring migration, and omitting the large numbers seen at Cape Kellett at the beginning of August, 1952, the resident summer adult population is estimated to be 65,000.

In early July, 1852, Sanderlings were frequently shot at Mercy Bay (Armstrong, 1857, p. 525). Two unsexed juvenals in the National Museum were collected by G. H. Wilkins near Cape Lambton on August 24, 1914. Porsild (1951) saw Sanderlings only near his camp, 25 miles west of Russell Point, where small flocks feeding along the sandy shore of a lake were observed daily between August 11 and 21, 1949. In 1952, Sanderlings were not recorded at De Salis Bay until June 8. In the following year, a flock of 25 was seen at Cape Kellett on May 30, and next day, 100 during a four-hour walk. On the latter day, eight were recorded at the Egg River. They remained numerous in small flocks in the Kellett region up to June 10, when only 10 were recorded in a six-hour walk, compared to 80 the preceding day in a two-hour walk. At Sachs Harbour they were never so abundant, but in both places, including the Kellett River valley, a few were seen most days throughout the period of record.

In 1952, autumn flocks, probably consisting principally of young birds, had assembled near Cape Kellett by August 1, when we saw 500 from the canoe in an hour's run along one of the sandbars, where they were feeding in the intertidal zone. Farther north, their numbers decreased, but they were still by far the commonest sandpiper, and between August 2 and 3, 50 were seen from the canoe along the shore in sixteen hours.

A female taken at De Salis Bay on June 9, 1952, had a yolk in the oviduct, and on July 20 a partial downy and its parent, a male with apparent incubating patches, were collected on the beach at Collinson Point. At Sachs Harbour in 1953 Höhn noted apparent nesting birds on July 3, 15, and 17, and on July 23 saw an adult with two downy young, one of which was collected. On July 15, he collected a male with well-developed incubating patches.

Authorities are agreed that the female Sanderling incubates, but doubt if the males assist (Bent, 1927; Witherby *et al.*, 1948; Salomonsen (1950–1). However, the two instances given above of males with incubating patches are supported by Bird and Bird (1941), and apparently by other specimens in the National Museum, although it is not always possible to recognize incubating patches on the dried skins.

Judging by the coloured plate in Manniche (1910, Pl. IV), the downy specimen from Sachs Harbour was about 2 days old, and the partial downy from Collinson Point about 8 days old. They agree in general markings with the plate, but the down is more grey and the buff areas distinctly paler, a difference perhaps due to an error in the colour printing of the plate. Also the white tips to the down of the back and head are larger and more conspicuous than in the plate.

No colour difference could be seen between eastern and western adults,

TABLE XXVIII

Measurements of Adult *Crocethia alba*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
Western specimens	21	116-123	119.0 ± .5	2.2	1.8 ± .28	16	118-130	123.6 ± .9	3.4	2.8 ± .49
Eastern specimens	23	115-127	119.5 ± .7	3.2	2.7 ± .40	21	119-128	123.3 ± .5	2.3	1.9 ± .29
	Bill from posterior edge of nostril					Bill from posterior edge of nostril				
Western specimens	20	20.0-23.5	21.93 ± .19	.84	3.8 ± .61	14	22.5-25.7	24.28 ± .22	.81	3.4 ± .64
Eastern specimens	23	19.5-24.5	22.02 ± .25	1.21	5.5 ± .81	21	21.8-25.1	23.91 ± .19	.86	3.6 ± .56
	Tarsus					Tarsus				
Western specimens	20	23.8-27.6	25.62 ± .20	.89	3.5 ± .55	16	24.9-28.5	26.70 ± .21	.86	3.2 ± .57
Eastern specimens	23	24.0-26.4	25.11 ± .16	.79	3.1 ± .46	18	24.2-28.2	26.26 ± .23	.96	3.7 ± .61

Origin of specimens. *Western:* British Columbia, 6 ♂♂, 7 ♀♀; Cape Bathurst, 3 ♀♀; Banks Island, 9 ♂♂, 2 ♀♀; Prince Patrick Island, 4 ♂♂, 3 ♀♀; Victoria Island, 1 ♀; Dolphin and Union Strait, 2 ♂♂. All taken between June 1 and October 16. *Eastern:* Ellesmere Island, 1 ♂; Chesterfield, 1 ♀; Manitoba, 9 ♂♂, 10 ♀♀; James Bay, 1 ♀; Ontario, 10 ♂♂, 9 ♀♀; Nova Scotia, 1 ♂; New York State, 2 ♂♂. All taken between May 16 and August 29.

or juvenals, both of which are well represented in the National Museum collection. In size, the only difference which approaches statistical (though not racial) significance ($t = 1.9$, P about .05) is the longer (.51 mm.) tarsus of the western males. It is supported by a difference of .44 mm. in the females, although this by itself is not significant ($t = 1.4$, P between .1 and 2). Table XXVIII also shows that the greatest difference between the sexes is in bill length. By this character 80 to 90 per cent of birds may be separated, and the distribution suggests that some of the overlap may be caused by wrongly sexed individuals. However, since there is no supporting evidence for this, they have not been excluded from the tabulated figures, and as they are fairly well distributed amongst the groups, they probably do not seriously affect comparison of the eastern and western means.

Males taken on June 2 and July 15 weighed respectively 68 gm. and 66 gm.

Phalaropus fulicarius (Linnaeus), Red Phalarope, *Aukshuak*

The Red Phalarope is moderately common in the marshes along the west coast of Banks Island and in the valleys of the rivers flowing down to it. It is scarce on the eastern side of the island, and also, apparently, in the valley of Sachs River. It seems to occur throughout the Queen Elizabeth Islands (Hennessey, 1910; MacDonald, 1953, 1954; Duvall and Handley, 1948). The total adult summer population of Banks Island is estimated to be 35,000.

Armstrong (1857, p. 525) says that this phalarope was frequently shot at Mercy Bay in early June. In 1914, Stefansson (1921, p. 237) recorded it on or near Bernard Island on June 30.

In 1952, the only Red Phalarope recorded on southern Banks Island was seen at De Salis Bay on July 1. In 1953, they were first observed at Cape Kellett on June 3, but not at Sachs Harbour until June 10. Thus they were slightly later arriving than the sandpipers. On July 4, 1953, a nest with four eggs was found in a grass marsh near the Kellett River. On July 29, a flock of 50 was seen off Sachs Harbour. After we left the valley of the Bernard River, July 12, Red Phalaropes were seen only in the immediate vicinity of the shore, usually in the lagoons bordering the north coast or at sea.

Peters (1934, b, c) and Brooks (1935), in rejecting the Spitsbergen race, *P.f. jourdaini*, have pointed out the rapid wear and fading which takes place in the feather edgings of the Red Phalaropes during migration and in the breeding season. More recently, Salomonsen (1950–1) says that the rapid wear in courtship makes the feather edgings on breeding specimens paler than those on migrant birds taken at the same date. Such wear, however, does not seem entirely to explain the average[1] paler feather edgings of three male and six female Red Phalaropes taken by MacDonald (1953) from a flock of 10 at the extreme north of Ellesmere Island on June 23, when compared with 16 males and 15 females from southern Baffin Island, mostly taken at Camp Kungovik between June 18 and 20 at the height of the migration (Soper, 1946). The significance of these pale Ellesmere Island

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[1] One male and one female were considerably more worn than the others, had a few grey feathers growing on the back, and appeared to have darker edging.

TABLE XXIX

Measurements of Adult *Phalaropus fulicarius*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
Alaska, western Canadian Arctic	6	121-130	126.0	—	—	8	129-138	133.6	—	—
Baffin Island	16	122-133	127.1±.79	3.2	2.5±.44	15	127-138	132.1±.81	3.1	2.4±.43
Southampton I., mainland W. of Hudson B.	6	121-126	124.2	—	—	6	129-138	132.8	—	—
Ellesmere I.	3	124-126	125.3	—	—	6	128-136	132.7	—	—
	Exposed culmen					Exposed culmen				
Alaska, western Canadian Arctic	6	20.0-23.4	21.7	—	—	7	21.6-24.0	22.53	—	—
Baffin Island	14	20.1-24.3	22.26±.32	1.2	5.4±1.03	13	21.3-24.3	22.85±.22	.78	3.4±.67
Southampton I., mainland W. of Hudson B.	5	20.9-23.3	22.08	—	—	6	22.8-24.3	23.58	—	—
Ellesmere I.	3	21.0-23.0	22.20	—	—	6	21.9-23.7	22.80	—	—
	Tarsus					Tarsus				
Alaska, western Canadian Arctic	6	21.5-22.6	21.87	—	—	8	21.2-23.5	22.29	—	—
Baffin Island	16	20.4-22.6	21.71±.15	.61	2.8±.49	15	21.0-23.3	22.13±.14	.55	2.5±.45
Southampton I., mainland W. of Hudson B.	6	20.9-23.1	22.08	—	—	6	21.4-23.2	22.25	—	—
Ellesmere I.	3	21.7-22.3	21.90	—	—	6	21.2-23.2	21.91	—	—

Origin of specimens. *Alaska, western Canadian Arctic:* north coast of Alaska, 2 ♂♂, 1 ♀; Cape Pathurst, 2 ♂♂; Banks Island, 2 ♂♂, 4 ♀♀; Victoria Island, 3 ♀♀. All taken between June 9 and July 19. *Baffin Island:* Camp Kungovik, 14 ♂♂, 13 ♀♀; Lake Nettilling, 1 ♀; Andrew Gordon Bay, 2 ♂♂, 1 ♀. All taken between June 9 and June 20. *Southampton Island, mainland west of Hudson Bay:* Southampton Island, 4 ♂♂, 5 ♀♀; Fullerton, 1 ♂, 1 ♀; Mistake Bay, 1 ♂. All taken between June 14 and July 7, except 3 undated. *Ellesmere Island:* near Alert, 3 ♂♂, 6 ♀♀. All taken June 23.

specimens cannot be properly judged from the material available. However, it would not be surprising if they, like some other Ellesmere Island birds (Godfrey, 1953), including the Knots with which they were feeding (MacDonald, 1953), were referable to a palaearctic population, which may still (*See* Jourdain, 1934, 1936) prove separable as *P.f. jourdaini.*

The few comparable Southampton Island and eastern Keewatin specimens seen average at least as dark as the Baffin Island series. Western specimens, including the small Banks Island series and two specimens from Melville Island, are too few and variable, both in date of capture and in colour, for useful comment. The measurements in Table XXIX do not show any constant differences.

The weights of four specimens taken at Sachs Harbour in 1953 were as follows: ♂, July 12, 47 gm.; ♀, June 12, 51.8 gm.; ♀, June 16, 43.5 gm.; ♀, July 12, 60 gm.

***Lobipes lobatus** (Linnaeus), Northern Phalarope, *Kchaiavuiualuk*

The Eskimos said that some years ago they used to see Northern Phalaropes regularly in the vicinity of Sachs Harbour, but recently they have become rare.

Stercorarius pomarinus (Temminck), Pomarine Jaeger, *Ishunga*

According to the Eskimos, in summers when lemmings are scarce, jaegers (they do not seem to distinguish the species clearly) do not breed, and few remain on Banks Island. Certainly in 1952, when the lemming population was at its lowest, the Pomarine Jaegers did not appear to be nesting, and none were recorded on land after June. This supports Southern's conclusion (1944, p. 14) that the variation in size of the breeding population is probably dependent on the lemming cycle (Cf. Bailey, 1948). The total estimated population of Banks Island, based on observations during the two summers, and therefore an average between moderate and poor lemming years, is 25,000. Pomarine Jaegers were recorded on Melville Island by Sabine (1824), and Hennessey (1910) reported them abundant and breeding at Winter Harbour (male collected) in 1909. Three unsexed adults and two young in the National Museum were taken at Cape Kellett between September 3 and 4, 1914, by G. H. Wilkins. A male was collected by C. Smith on Banks Island on June 19, 1944.

Apart from two jaegers believed to have been this species seen at sea between Cape Lambton and Sachs Harbour on July 29, Pomarine Jaegers were recorded in 1952 only at De Salis Bay between June 7 and 29. Nine of the total of 31 were recorded near our camp, feeding on garbage which had been thrown out on the ice. On June 29, another 15 were seen with a large flock of Parasitic and Long-tailed Jaegers apparently feeding on insects and spiders in the vegetation growing on the dry, sandy spit at the south side of De Salis Bay. Manning's 1953 records of this species for the Cape Kellett region were lost, but Pomarine Jaegers were certainly numerous, particularly near the Kellett River. At Sachs Harbour they were first seen on May 30, when four were observed flying northeastward. Several pairs seen on our walk up the western coast and along the valley of the Bernard River were undoubtedly nesting.

TABLE XXX

Measurements of Adult *Stercorarius pomarinus*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
Flattened wing	13	342-367	354.3 ± 2.3	8.3	2.3 ± .46	13	350-370	360.8 ± 1.5	5.4	1.5 ± .29
Bill from feathers at groove[1]	13	32.3-37.3	35.35 ± .42	1.52	4.3 ± .84	13	33.4-38.0	35.34 ± .37	1.34	3.8 ± .74
Tarsus	13	51.5-57.4	53.91 ± .40	1.46	2.7 ± .53	13	54.0-57.8	55.90 ± .36	1.31	2.3 ± .46

Origin of specimens. North coast of Alaska, 2 ♂♂, 2 ♀♀; Mackenzie Delta, 1 ♀; Franklin Bay, 1 ♂; Banks Island, 5 ♂♂, 4 ♀♀; Melville Island, 1 ♂; Dolphin and Union Strait, 3 ♂♂, 5 ♀♀; Cornwallis Island, 1 ♀; Baffin Island, 1 ♂; Southampton Island, 1 ♂. All specimens taken between June 3 and August 26.

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[1] In the Pomarine Jaeger the exposed culmen clearly varied considerably with feather wear; moulting of the feathers and shrinkage of the skin also made the total culmen measurements uncertain. The measurement selected, therefore, was from the base of the feathers at the proximal end of the groove which lies on either side of the culmen, to the tip of the bill. The measurement is not entirely satisfactory, as the feathering in some specimens slopes upward and backward, but there is often a slight pit which conveniently takes the tip of the calipers, and at least errors should be random and not seasonally correlated.

Ten of the 196 Pomarine Jaegers recorded by Manning and Macpherson were dark-phased, but only two of 150 seen by Höhn. The difference may result from the more restricted area covered by Höhn. Southern (1944, p. 12) considered the proportion to be fairly constant throughout the breeding range, with from 5 to 20 per cent dark. There is only one dark-phased bird in the National Museum. No geographical variation in colour or size could be detected in the rather small series of Canadian and Alaskan birds in the National Museum, but only three specimens were available from the eastern Canadian Arctic, where Manning's observations indicate that Pomarine Jaegers are usually scarcer than in the west, or at least than on Banks Island. They may also be scarce (*See* Bailey, 1948) along the arctic coast of Alaska, but one specimen from Barter Island (June 19) and two from Point Collinson (June 4, 7) in the National Museum indicate that the gap in breeding range shown in that region on Southern's map (1944) is not complete.

Two adult males taken at Sachs Harbour on June 14 and 24, 1953, weighed 1.1 kg. and 625 gm. respectively.

Stercorarius parasiticus (Linnaeus), Parasitic Jaeger, *Ishunga*

The Parasitic Jaeger is the scarcest of the three jaegers on Banks Island, taken as a whole. It appeared to be most numerous on the eastern side of the island, and at De Salis Bay in 1952 outnumbered the Pomarine and almost equalled the Long-tailed. No Parasitic Jaegers were seen on the north coast in 1952 or 1953. Armstrong (1857, p. 521) recorded the species arriving at Mercy Bay on May 31, 1852, but this may well refer to either of the other jaegers, which he does not mention. Early records for Melville Island (Sabine, 1824; Fisher, 1821, p. 217) may refer to *S. longicaudus*, which was only described in 1819 and not apparently generally recognized until considerably later. However, Duvall and Handley (1948) took specimens of the Parasitic Jaeger on Devon, Cornwallis, and Bathurst islands, and there are four, including a flightless juvenal, in the National Museum taken by J. P. Kelsall at Resolute Bay, Cornwallis Island, on August 15, 1948. The total adult population of Banks Island is estimated to be 3,500.

A female in the National Museum was taken at Cape Kellett on July 6, 1915, and an unsexed specimen on August 9, 1916, both by P. Bernard.

In 1952, the first Parasitic Jaeger was seen at De Salis Bay on June 6. Besides those recorded in Table II, eight were seen near our camp at the mouth of Big River on August 2, and six between Cape Kellett and Storkerson Bay from the canoe between August 1 and 3. In 1953 the first was seen at the Egg River on June 2, but none were observed at Cape Kellett, and only three (on June 24) at Sachs Harbour.

On July 17, 1952, a pair was observed injury-feigning on the west side of De Salis Bay, but over half the Parasitic Jaegers seen there that year appeared to be non-breeding birds. However, further observations are required to determine whether this is normal for the island or related to the scarcity of lemmings. The proportion of breeding to non-breeding birds was certainly higher in 1953.

Four (male collected) of the 81 Parasitic Jaegers seen by Manning and Macpherson were dark-phased. One dark-phased bird was seen with a presumed mate of normal colour near Raddi Lake on June 20, 1952. Such mixed matings are to be expected in areas where one phase greatly out-

TABLE XXXI

Measurements of Adult *Stercorarius parasiticus*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
Flattened wing	23	314-341	325.8±1.3	6.2	1.9±.28	17	321-352	333.9±2.1	8.6	2.6±.44
Bill from feathers at groove[1]	22	26.8-29.5	28.30±.16	.76	2.7±.41	16	27.0-29.6	27.78±.19	.77	2.7±.47
Tarsus	23	42.7-48.0	45.48±.27	1.29	2.8±.42	17	43.3-49.0	46.03±.34	1.40	3.0±.52

Origin of specimens. North coast of Alaska, 5 ♀♀; Baillie Island, 1 ♂; Banks Island, 2 ♂♂, 1 ♀; Cornwallis Island, 2 ♂♂, 1 ♀; Dolphin and Union Strait, 1 ♀; Baffin Island, 2 ♂♂, 2 ♀♀; Southampton Island, 5 ♂♂, 2 ♀♀; Chesterfield, 1 ♂, 1 ♀; Thelon, 2 ♂♂; Churchill, 7 ♂♂, 3 ♀♀; Cape Henrietta Maria, 1 ♂, 1 ♀. All specimens taken between June 3 and August 26.

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[1] *See* Pomarine Jaeger for description of this measurement.

numbers the other, and Southern's figures (1943, p. 478) indicate that there is usually, though not invariably, no selective mating between the phases. Of the 49 adults in the National Museum, six are dark-phased and two are intermediate, although closer to the pale form, but there has no doubt been some selective collecting of the rarer dark form. The three Cornwallis specimens mentioned above consist of an adult dark-phased male, its presumed mate, a pale-phased female, and a flightless juvenal which still has a little down adhering to the feathers. This juvenal is very different from a slightly older pale-phased bird taken in Baffin Island, and there seems no doubt that it is dark-phased. The head, mantle, scapulars, and upper tail coverts of the Cornwallis Island juvenal are Fuscous to Fuscous Black with barely perceptible pale edgings on a few feathers. The throat, breast, and upper belly are Fuscous. There is some barring or pale edging on the lower belly, and under tail and medium and greater wing coverts, but far less even in these areas than there is on the pale-phased Baffin specimen. It is only on the lesser wing coverts that the pale edging equals or even exceeds that on the pale-phased bird. If, as Southern (1943, p. 456) suggests, the dimorphism is controlled by a single pair of alleles, the most likely genetical relationship for the three specimens described above is, ♂ Dp x ♀ pp=juv. Dp. The relationship, ♂ DD x ♀ pp=juv. Dp, is less probable, as the proportion of dark individuals in the population is so small.

No geographical colour or size differences were observed amongst the Canadian and Alaskan specimens in the National Museum. The measurements of these have therefore been lumped together in Table XXXI.

An adult female taken at Sachs Harbour on June 24, 1953, weighed 519 gm.

Stercorarius longicaudus Vieillot, Long-tailed Jaeger, *Ishunga*

The Long-tailed Jaeger is abundant even in the extreme north of Ellesmere Island (MacDonald, 1953) and is by far the commonest of the three jaegers summering on Banks Island. It nests in suitable grassy areas throughout the island, and the total adult summering population is estimated to be 90,000, of which approximately two-thirds are nesting birds. There was not much variation between 1952 and 1953 either in the total number seen or in the proportion apparently breeding. On Banks Island this species was therefore apparently less affected by the lemming scarcity of 1952 than were the Pomarine and Parasitic Jaegers, although in Greenland (Løppenthin, 1943; Salomonsen, 1950–1) it seems to be very sensitive to the cycle. On Prince Patrick Island Long-tailed Jaegers were common both in 1949, a good lemming year, and in 1952, when lemmings were very scarce. However, only one nest was found in the latter year against several in the former (MacDonald, 1954). In 1954, another poor lemming year on Prince Patrick Island, Macpherson found Long-tailed Jaegers scarce, and none were seen after July 23. The apparent difference may be caused by variations in the insect and spider populations in different places and years, since these animals, particularly caterpillars and spiders, sometimes form much of the food of Long-tailed Jaegers[1], and the warm weather in

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[1] Out of 14 stomachs of west Baffin Long-tailed Jaegers examined between June 9 and June 21 in 1939 and 1940, 12 contained insects and/or spiders; four, remains of egg shells; two, young birds; and only one, part of a lemming (Manning, Field Notes). Lemming were rather scarce in these years (Manning, 1943), but some Long-tailed Jaegers were certainly nesting, though perhaps not so high a proportion as on Banks Island.

June 1952 may have caused an early abundance of them. The most obvious insect, the mosquito, was seen that year as early as June 19, and on June 23 they were quite troublesome.

One male (June 18, 1915) and one unsexed specimen (June 30, 1915) in the National Museum were collected at Cape Kellett by P. Bernard, and one female (June 19, 1944) by C. Smith. Porsild (1951) records a pair on August 14, 1949, 25 miles west of Russell Point.

In 1952, the first Long-tailed Jaeger was seen at De Salis Bay on June 1; in 1953, at Sachs Harbour on June 3, and at Cape Kellett on June 4. Half of those recorded at De Salis Bay were in flocks, and apparently non-breeding birds. One flock of 30, mixed with Pomarine and Parasitic Jaegers, was seen on July 29, feeding, presumably, on insects and spiders in the vegetation on the dry spit on the south side of De Salis Bay. Most Long-tailed Jaegers encountered on our walk to Sachs Harbour in June, 1952, and on our walk from there to the Thomsen River in June and July, 1953, were in pairs and apparently nesting. The same applies to most of those seen on the north coast in July and August, 1953. A partially downy bird was observed near Back Point on August 15.

Løppenthin (1932) separated the Greenland Long-tailed Jaegers from the typical European form under the name *S.l. pallescens* on the relative paleness of the ventral surface of the former. Hørring (1937) referred four Canadian specimens to this race, and Løppenthin (1943) published additional evidence (*See* Table XXXII) for the separation of the palaearctic and nearctic forms. This division was supported by Salomonsen (1950–1), who found 76 per cent of 83 Greenland and four American specimens separable from 28 European birds, and by Shortt (1951) on the basis of material in the Royal Ontario Museum of Zoology.

Table XXXII shows that if an arbitrary division is made between groups B-C and C, 83 per cent of Løppenthin's palaearctic and nearctic specimens are separable, and the same percentage is obtainable theoretically by calculating the coefficient of difference and using Table XII of Mayr *et al.* (1953). Løppenthin's excellent illustration (1943, p. 4) of the main colour types permitted 71 Canadian and two Alaskan adults in the National Museum to be graded according to his system with what is thought to be fair accuracy. Using the figures thereby obtained, it was found that the joint non-overlap (Mayr *et al.*, 1953) in a comparison with those for Løppenthin's palaearctic birds was 75 per cent, whereas 77 per cent could actually be separated by an arbitrary division between groups B-C and C. Table XXXII also makes obvious the similarity between Løppenthin's Greenland specimens and those in the National Museum from arctic Canada.

Taken at their face value, the percentages given above would appear to justify the subspecific separation of the nearctic and palaearctic populations, particularly as the criteria required for dichotomy of an otherwise holoarctic, monotypic species might justifiably be lower than that for the multiple division of a more plastic form. However, contrary to Løppenthin (1943, p. 3), the males appear to average considerably paler than the females[1]. Obviously, therefore, unless the proportion of males and females

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[1] There is no obvious explanation for the darkness of the unsexed specimens of Table XXXII. Several of them are rather old and dirty, but it was thought that sufficient allowance had been made for discoloration.

TABLE XXXII

Stercorarius longicaudus

Colour types (Løppenthin, 1943)	A	A-B	B	B-C	C	C-D	D	Total specimens	Mean	σ
Colour types expressed numerically	1	2	3	4	5	6	7	—	—	—
Palaearctic breeding birds (Løppenthin, 1943)	—	1	6	7	14	7	1	36	4.64 ± .19	1.14
Palaearctic migrants (Løppenthin, 1943)	—	1	—	—	7	6	5	19	5.68 ± .27	1.17
Total palaearctic specimens (Løppenthin, 1943)	—	3	6	7	21	14	6	57[1]	4.96 ± .17	1.29
Nearctic specimens (Løppenthin, 1943)	5	23	25	5	5	—	—	63	2.71 ± .13	1.00
♂♂ Nearctic specimens (National Museum)	10	9	8	7	3	—	—	37	2.57 ± .21	1.29
♀♀ Nearctic specimens (National Museum)	—	5	6	8	6	1	—	26	3.69 ± .22	1.14
Unsexed nearctic specimens (National Museum)	—	—	1	5	4	—	—	10	—	—
Total nearctic specimens (National Museum)	10	14	15	20	13	1	—	73	3.21 ± .16	1.35

Fifty-seven of Løppenthin's specimens came from Greenland, six from arctic North America. Seventy-one of the National Museum birds were taken in arctic or subarctic Canada, and two in Alaska.

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[1] Including two specimens not designated either as breeding or migrant birds.

TABLE XXXIII

Measurements of Adult *Stercorarius longicaudus*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
Flattened wing..................	36	296-322	307.1 ±1.2	7.2	2.4 ±.28	28	291-332	308.9 ±1.7	8.8	2.9 ±.39
Exposed culmen................	36	24.3-28.2	26.17 ±.15	.91	3.5 ±.41	26	23.5-30.5	26.23 ±.29	1.50	5.7 ±.80
Tarsus........................	35	39.2-46.2	42.89 ±.28	1.66	3.9 ±.46	28	40.0-47.6	43.24 ±.29	1.54	3.6 ±.48

Origin of specimens. North coast of Alaska, 2 ♂♂; Herschel Island, 1 ♂; Franklin Bay, 1 ♂; Banks Island, 5 ♂♂, 4 ♀♀; Prince Patrick Island, 11 ♂♂, 5 ♀♀; Melville Island, 1 ♀; Victoria Island (Walker Bay), 1 ♂; Dolphin and Union Strait, 1 ♂, 1 ♀; Ellesmere Island, 2 ♂♂, 7 ♀♀; Devon Island, 1 ♂; Baffin Island, 6 ♂♂, 4 ♀♀; Southampton Island, 3 ♂♂, 4 ♀♀; eastern Mackenzie District, Keewatin mainland, 3 ♂♂, 2 ♀♀. All specimens taken between June 6 and August 31.

were the same in the palaearctic and nearctic series compared, a distinct bias would be introduced. Unfortunately neither Løppenthin (1943) nor Salomonsen (1950–1) gives the proportion of males in his series. The second point, which makes the recognition of *S.l. pallescens* unacceptable without additional evidence, is the dependence of Løppenthin's palaearctic series on Iceland and Faeroe migrants. Since east Greenland birds so clearly belong to the pale-breasted population, it is particularly surprising that migrants from these islands average darker than the breeding Scandinavian specimens. Could they perhaps be yearling birds, and, if so, are yearlings darker?

No obvious geographical trend in ventral colour could be seen within the Canadian and Alaskan populations, although it will be noted that the standard deviation of this series is larger than that of Løppenthin's Greenland birds. This difference, however, may be due to the system of grading employed. In wing, bill, and tarsus measurements also, the Canadian and Alaskan series seem extremely constant geographically, and the whole series is therefore given together in Table XXXIII.

Two adult females taken at Sachs Harbour on June 6 and 23 weighed 355 gm. and 299 gm., respectively.

Larus hyperboreus hyperboreus Gunnerus, Glaucous Gull, *Nauiak*

The Glaucous Gull occurs throughout the Arctic Islands. It is a fairly numerous summer resident throughout Banks Island, particularly in the coastal regions, where it was found nesting on sea cliffs, sandbars, and marine and lacustrine islands. The total early July population is estimated to be 20,000. The large numbers seen from the canoe between Cape Kellett and Storkerson Bay at the beginning of August, 1952, suggest that non-breeding birds or birds that have lost their nests on Banks Island and probably the islands farther north may congregate along that coast toward the autumn. With a very few exceptions, Glaucous Gulls seen prior to about August 10 appeared to be in full adult plumage. Juvenals were seen on the north coast in August, and most of those recorded at Sachs Harbour and Cape Kellett in September were also birds of the year.

A Glaucous Gull was shot in Prince of Wales Strait north of the Princess Royal Islands on September 13, 1850, and in 1851 the first gulls, presumably this species, were seen on May 27 (Armstrong, 1857, pp. 222, 332). Next year, Collinson (1889, p. 202) first saw them near the Princess Royal Islands on May 30. In 1952 the first Glaucous Gull was seen at De Salis Bay on May 23. On May 13, 1953, several were observed at the floe opposite Sachs Harbour, where they had probably been for some time. On May 19, three were seen near the Cape Kellett cliffs, and on the same day, six had gathered around a caribou kill within two hours, but they were not seen again over the land near Cape Kellett until May 24.

The egg-eating habits of this species are well known (Bent, 1947). Two instances of this were seen in 1953, when a Glaucous Gull was observed robbing a Black Brant's nest and another was flushed from a destroyed Pacific Eider's nest. On July 9, 1953, near Sachs Harbour, one was seen killing a downy young Lesser Snow Goose, and two others were observed attacking a downy Brant near Windrum Lagoon on July 15, 1952. Frequently, however, they nest in or beside goose and eider colonies, apparently without attempting to molest their neighbours. This seemed to be the case at Moose Island, and also at the De Salis Bay Black Brant colony, where there were about 25 untouched Brant eggs lying in the open only a few yards from a Glaucous Gull's nest.

Nests found

1952

De Salis Bay: Four near entrance to Windrum Lagoon; 10 on island in lagoon; one on Brant colony island in lake west of lagoon; one on island in another lake west of lagoon.

Between Cape Lambton and the Masik River: Seven colonies of between 30 and 50 gulls. At some of these colonies up to two-thirds of the gulls were Thayer's Gulls; at others, all may have been that species.

Between Raddi Lake and Sachs Harbour: Two on islands in separate lakes. Thirty gulls thought to be nesting were also seen at the Brant colony island in lake 10 miles east of Sachs Harbour.

Between Cape Kellett and Storkerson Bay: About 10 nests were observed from the canoe on the sandbars which run parallel to the shore.

1953

Sachs Harbour: One on grass hummock in lake south of the Sachs River.

West coast: One with three eggs containing feathered chicks on July 2 on Moose Island. Two on island in lake and one on sandbar north of Storkerson Bay. One on island in lake 12 miles up the Bernard River.

From the above list it will be seen that in Banks Island the Glaucous Gull nests with equal readiness on cliffs and on the ground. In Greenland also (Salomonsen, 1950–1, p. 304), and perhaps in Newfoundland (Bent, 1947), it may also occasionally nest on the ground, but in the eastern Canadian Arctic, where the Herring Gull is a frequent ground nesting species, Manning (1949) has observed Glaucous Gulls nesting only on cliffs, and as yet there seem to be no definite records of other situations.

Rand (1942) considered that *L.h. hyperboreus* and *L.h. barrovianus* do not represent opposite ends of a cline, and that if intergradation occurs, it must be between Coronation Gulf and the Mackenzie River Delta. At that time there was only one specimen in the National Museum from Banks Island, and none from Prince Patrick Island. Both these islands lie to the north of Rand's possible area of intergradation, from which there is still no new material, although it may be mentioned that Oberholser (1918) referred three specimens from Franklin Bay to *L.h. barrovianus*. The recent Banks and Prince Patrick Island specimens, taken together with the Victoria Island, Dolphin and Union Strait, and Coronation Gulf birds available to Rand show (Table XXXIV) that the western Canadian Arctic Glaucous Gulls average smaller in wing, bill, and tarsus than those from Greenland and the eastern Canadian Arctic. The difference is most pronounced in the females, the means for some measurements of which approach the mid-point between the eastern *L.h. hyperboreus* and the four female *L.h. barrovianus* from the Mackenzie Delta and Alaska. Why these differences between the eastern and western series should be greater in the females is not clear. The picture could have been confused by errors in sexing, and the exclusion of one eastern male which is suspiciously small (*See* note 1 of Table XXXIV) would have slightly increased the difference between the males. Sexing errors, however, can hardly be the sole cause.

A cline in diminishing size from east to west in *L. hyperboreus*, or perhaps it would be more correct to say the somewhat intermediate position[1] of the western representatives of *L.h. hyperboreus*, decreases the likelihood of a direct relationship between *L.g. glaucoides* and *L.h. barrovianus* unless it be through a palaearctic population. This is made even less probable by the apparent existence of a large pale form of *L. hyperboreus* in eastern Siberia (Portenko, 1939), although this form does not necessarily differ from *L.h. hyperboreus* of the Canadian Arctic. It will also be noted (Table XXXIV) that the mean tarsus lengths of the available male and female *L.h. barrovianus* are not appreciably less than those of *L.h. hyperboreus*. On the other hand, the mean tarsus lengths of the National Museum and British Museum specimens of *L.g. glaucoides* from Iceland, Greenland, and eastern Canada are only 56.9 (51.4-59.8) mm. for 9 ♂♂, and 55.4 (54.0-57.9) mm. for 5 ♀♀. If a larger series shows this difference in tarsus measurements to be constant[2], it may be the most effective means of separating the two species. It should also be noted that, although very likely caused by sampling accident, the mean tarsus length of five northeast Greenland male *L.h. hyperboreus* is only 69.4 mm., rather less than every other group of either race of *L. hyperboreus*.

With the limited and, in some cases, rather old and discoloured specimens, available from the Mackenzie Delta and Alaska, the colour differences between *L.h. hyperboreus* and *L.h. barrovianus* are not easily judged, but it does appear that western *L.h. hyperboreus* specimens show less tendency toward *L.h. barrovianus* in this character than in that of size.

Two (both from the Mackenzie Delta) of the eight (one unsexed) *L.h. barrovianus* specimens in the National Museum from the Mackenzie Delta (five specimens) and northern Alaska (three specimens) have a mantle only slightly darker than the average *L.h. hyperboreus*. Four specimens have a distinctly dark mantle, and one, from Point Barrow, a very dark mantle. Those with distinctly dark mantles can be matched by two specimens from Baffin Island, two from Prince Patrick Island, one from Dolphin and Union Strait, and one from Banks Island. In addition, the mantle of one De Salis Bay male, taken June 4, matches the very dark Point Barrow specimen, and its mantle extends unusually far down the primaries, a character, though somewhat confused by dirt, shown by most of the Mackenzie Delta and Alaska specimens, including the two with pale mantles. Of its measurements (wing 459 mm., exposed culmen 58.8 mm., tarsus 74 mm., bill depth 19.1 mm.), however, only that of bill depth tends toward *L.h. barrovianus*.

The weight of a male taken at Sachs Harbour on June 14, 1953, was 2.3 kg.

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[1] The specimens used in Table XXXV are hardly sufficient for any definite trend to be observed within the western Canadian Arctic group, but it may be noted that the Prince Patrick Island birds are not larger than those of Banks Island, although they are farther from the breeding area of *L.h. barrovianus*. Clearly more material is required from the Queen Elizabeth Islands to determine the eastward extension of the small-sized western population in the far north.

[2] There is good agreement between the tarsus measurements of *L.h. barrovianus* given in Table XXXIV and those given by Dwight (1906): mean of five adult ♂♂ =71 mm., nine adult ♀♀ =66 mm. His three juvenile ♂♂ and six juvenile ♀♀ average the same as the adults.

TABLE XXXIV

Measurements of Adult *Larus hyperboreus hyperboreus* and Adult *L.h. barrovianus*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Flattened wing					Flattened wing				
L.h. hyperboreus (west)...........	22	443-480	459.0±2.0	9.3	2.0±.31	16	415-452	435.5±2.7	10.7	2.5±.43
L.h. hyperboreus (east)...........	14	427[1]-483	461.8±3.4	12.9	2.8±.53	7[3]	427-458	447.1±4.1	10.9	2.5±.66
L.h. barrovianus[2]...............	3	427-454	442.3	—	—	4	412-429	422.5	—	—
	Exposed culmen[4]					Exposed culmen[4]				
L.h. hyperboreus (west)...........	22	53.5-66.0	60.25±.69	3.24	5.4±.81	16	50.0-57.0	54.03±.50	1.98	3.7±.65
L.h. hyperboreus (east)...........	14	57.0-67.0	61.54±.81	3.05	5.0±.94	7[3]	54.5-62.7	59.14±.94	2.49	4.2±1.13
L.h. barrovianus[2]...............	3	55.0-57.5	56.2	—	—	3	46.5-54.5	50.5	—	—
	Tarsus					Tarsus				
L.h. hyperboreus (west)...........	21	65.5-76.5	72.07±.60	2.77	3.8±.59	16	61.5-70.0	66.37±.56	2.24	3.4±.60
L.h. hyperboreus (east)...........	14	67.2-77.7	72.25±.80	3.01	4.2±.78	7[3]	65.2-73.7	69.29±1.01	2.66	3.8±1.03
L.h. barrovianus................	3	68.5-74.0	71.7	—	—	4	65.7-67.0	66.25	—	—
	Depth of bill at distal extremity of lateral feathering					Depth of bill at distal extremity of lateral feathering				
L.h. hyperboreus (west)...........	21	19.1-22.0	21.07±.17	.76	3.6±.56	17	17.0-19.6	18.40±.15	.63	3.4±.58
L.h. hyperboreus (east)...........	14	19.4-22.1	21.01±.20	.76	3.6±.68	7[3]	17.3-21.5	19.74±.61	1.62	8.2±2.20
L.h. barrovianus................	3	17.8-18.5	18.20	—	—	4	16.4-17.9	16.95	—	—

Origin of specimens. *L.h. hyperboreus* (*west*): Prince Patrick Island, 9 ♂♂, 7 ♀♀; Banks Island, 10 ♂♂, 4 ♀♀; Dolphin and Union Strait, 2 ♂♂, 3 ♀♀; Coronation Gulf, 2 ♀♀; Victoria Island (DeHaven Point), 1 ♀, (Walker Bay), 1 ♂. All taken between May 28 and September 15. (*East*): Greenland, 5 ♂♂, 1 ♀; Hudson Strait, 1 ♂; Baffin Island (south), 6 ♂♂, 3 ♀♀, (north), 2 ♂♂, 1 ♀; Devon Island, 2 ♀♀. All taken between May 31 and September 2. *L.h. barrovianus:* Mackenzie Delta, 2 ♂♂, 2 ♀♀; Alaska (Barter Island), 1 ♂; (Camden Bay), 1 ♀, (Point Barrow), 1 ♀. All taken between July 1 and August 28.

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[1] This specimen from Greenland may have been a mis-sexed bird, but its other measurements were not outstandingly small. The next smallest wing measurement was 453 mm.

[2] The measurements given by Bailey (1948) for wing (after allowing for the difference between wing chord and flattened wing) and culmen of *L.h. barrovianus* agree well with those given here, but those of Dwight (1906) average distinctly larger. His wing and bill measurements of *L.h. hyperboreus* also tend to be bigger, and Bailey suggests this may be due to a difference in technique or because wintering or migrant birds were used, but Dwight (1919, p. 246) clearly states that his specimens were all breeding birds from Greenland and Alaska.

[3] Two specimens were omitted from the series of eastern females in the National Museum. One, labelled ♀ from Baffin Island, wing 481 mm., bill 61.0 mm. x 22.0 mm., tarsus 72.8 mm., was thought to have been mis-sexed; the other, taken near Killinek Island on August 4, 1948 (*See* Hildebrand, 1950) was omitted, perhaps with less justification, because of the possibility that it was a hybrid with *L.g. glaucoides*. Its measurements were: wing, 427 mm., bill (broken), certainly under 50 mm. x 17 mm., tarsus, 62.5 mm. The mantle was darker than all but two *L.h. hyperboreus* and *L.h. barrovianus* specimens examined.

[4] Measured from the apex of the frontal feathering, which was pressed down with the finger when necessary.

TABLE XXXV

Mean Measurements of Adult *Larus hyperboreus hyperboreus*

	♂				♀			
Place	Flattened wing	Exposed culmen	Bill[1] depth	Tarsus	Flattened wing	Exposed culmen	Bill[1] depth	Tarsus
Prince Patrick I.	(9) 456.3	(9) 60.3	(9) 21.2	(8) 71.7	(7) 437.4	(7) 53.8	(7) 18.5	(7) 65.9
Mainland coast and Victoria I.	(3) 464.0	(3) 59.3	(3) 20.7	(3) 72.0	(6) 438.0	(6) 54.9	(6) 18.5	(6) 67.6
Banks I.	(10) 459.6	(10) 60.5	(9) 21.0	(10) 72.4	(4) 428.0	(4) 53.8	(4) 18.0	(4) 65.4

Note: The number of specimens measured are given in the brackets.

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[1] Measured at distal extremity of the lateral feathering.

Larus thayeri Brooks, Thayer's Gull

There are specimens of Thayer's Gull in the National Museum from Cornwallis and Devon islands, and Ross (1835) says specimens were taken on Melville Island[1]. On Banks Island it is common only in the vicinity of its nesting colonies, one of which is at Cape M'Clure near the northern extremity of the island. No evidence of colonies was seen along the cliffs between Mercy Bay and Russell Point, and perhaps this coast remains icebound too late to be suitable. Judging by the number of Thayer's Gulls seen at the colonies, and allowing for another 50 per cent of non-nesting birds or birds absent from the colonies, but not for any nesting inland, the total population of Thayer's Gull on Banks Island is estimated to be 500.

Armstrong (1857, pp. 347, 521) observed this species on the Princess Royal Islands on June 8, 1851, and at Mercy Bay about the end of May, 1852. Two juvenals in the National Museum were collected at Cape Kellett on September 6 and 17, 1914, by G. H. Wilkins, and two males on June 9 and 16, 1915, by P. Bernard. Porsild (1951) remarks that Herring [Thayer's] Gulls were common on nearly all the lakes he visited on Banks Island in 1949. However, this statement was based largely on observations made from the air, and he now agrees that it is probable that some of the records referred to the commoner Glaucous Gull (oral information). He visited a nesting colony on a cliff north of Cape Lambton on August 2.

In 1952, few Thayer's Gulls were seen except in the vicinity of the nesting colonies on the southwest coast between Nelson Head and the Masik River, and at Cape M'Clure on the north coast. The southernmost of these colonies is situated about 5 miles southeast of Cape Lambton. In 1952, it consisted of about 15 pairs of Thayer's Gulls (♂, ♀, one (not sexed) collected) and seven pairs of Glaucous. Between Cape Lambton and the Masik River we saw six other colonies, most of which appeared to consist of two-thirds Thayer's Gulls and one-third Glaucous, although at some colonies only the former were identified. The total number of gulls at each of the colonies was estimated to be between 30 and 50. Fourteen gull nests were noted on the cliffs at Cape M'Clure, but only two gulls were identified with certainty. They were both Thayer's Gulls. Two Thayer's Gulls (♂ collected) were seen at De Salis Bay on June 13, one (♂, collected) at Antler Cove on August 15, and one (♀, collected) at Castel Bay on August 25.

In 1953, no Thayer's Gulls were seen until August 21, when two adults (♀, collected) and one juvenile (♂, collected) appeared near our camp at Back Point. On August 26, two juveniles visited our camp at Pim Ravine. Three were seen during four hours walking on the east coast about 15 miles south of Russell Point between August 30 and 31, and 20 from the canoe between August 31 and September 1, while travelling from there to the Princess Royal Islands.

Unlike the eastern Canadian Arctic Herring Gull, which is predominantly a ground nesting species (Cf. Soper, 1946), occupying small islands and large boulders in lakes scattered throughout the hinterland, Thayer's Gull, at least on Banks Island, nests only in cliff colonies, leaving other situations to the Glaucous Gull.

There is no difficulty in deciding that the five adult specimens from

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[1] Records for the Herring Gull, *L. argentatus*, on Banks Island and the islands to the north may be assumed to refer to this species.

Banks Island are typical of the *thayeri* population. A more complex question is the relationship of this population as a whole to *L.a. smithsonianus* on the one hand and *L.g. kumlieni* on the other. The A.O.U. Check List (1931) and Rand (1942) place *thayeri* in the species *L. argentatus*. Salomonsen (1950–1) would apparently also have added *kumlieni* and *glaucoides* to that species were it not that while specimens taken by the Fifth Thule Expedition (cf. Hørring, 1937) at Danish Island near Frozen Strait are typical *thayeri*. Bray (1943) records "a number of skins" taken by Manning from Polecat Harbour in the same region as near typical *L.a. smithsonianus*. Salomonsen (1950–1) therefore separates *thayeri* from *L. argentatus*, but keeps it with *kumlieni* in the species *L. glaucoides*. Four, all adults, of Manning's six skins, taken in 1937 on the north side of Frozen Strait, are in the National Museum. Two of these, taken at Polecat Harbour (June 1, testis 15 mm.; June 4, testis 20 mm.) are, as Bray (1943) says, typical *L.a. smithsonianus;* the other two, both June 7 (testis 18 mm.), from the nesting colony at Brooks Bluff, 8 miles distant, are equally typical *thayeri*. The occurrence of two typical *L.a. smithsonianus* on the north side of Frozen Strait, where the main cliff nesting population is clearly *thayeri*, as evidenced by the Brooks Bluff and Danish Island specimens (Hørring, 1937), might be dismissed as chance were it not that Manning's notes show that ground nesting gulls occurred in the region. There is also an absence of intergrades amongst the Southampton Island specimens, 11 of which, including the two from Frozen Strait, have been examined. Of these, one unsexed specimen from Walrus Island[1] is typical *thayeri;* the remainder are clearly *L.a smithsonianus:* indeed, they average less white on the wings than do the small series in the National Museum from the Gulf of St. Lawrence, and have paler mantles than the James Bay specimens. The wings of the Southampton Island birds are no shorter than the average of those from James Bay (Table XXXVI), and although the mean bill size is slightly less, the difference is small compared to what would be expected if the population intergraded with *thayeri*. It is evident, therefore, that *thayeri* and *L.a. smithsonianus* behave as distinct species in the Southampton Island–Frozen Strait region[2]. To the westward there is no sign of intergradation in the

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[1] This island is about 20 miles off the southeast coast of Southampton Island. No Thayer's or Herring Gulls were nesting on the island when this specimen was taken.

[2] Since this was written, the following specimens in the British Museum, collected by Manning in 1937 and 1938 from Frozen Strait and Southampton Island, have been measured:

B. M. No.	Sex	Place	Date	Flattened Wing	Exposed Culmen	Depth at Base	Tarsus
			L.a. smithsonianus				
1947.6.32	♂	N. side Frozen Strait	July 8	398	49.2	15.6	63.3
1947.6.34	♂	Lyson Point	July 10	434	58.0	18.9	69.7
1947.6.33	♂	Lyson Point	July 10	433	53.0	18.0	66.0
			L. thayeri				
1947.6.38	♂	Expectation Pt.	June 10	410	50.5	—	65.0
1947.6.36	♀	Canyon River	Aug. 20	398	45.8	14.3	55.2
1947.6.37	♀	Canyon River	Aug. 20	393	48.8	15.1	60.0

The Frozen Strait specimen is unusually small for *L.a. smithsonianus*, but this small size cannot yet be considered proof of intergradation. Its irides were sulphur yellow. The two Canyon River females are of particular interest, since they and a typical juvenal *L. thayeri* undoubtedly belonged to a cliff colony of Glaucous and dark-winged gulls. The latter almost certainly are all *L. thayeri*, and it is most likely that the other colonies along the northeast coast of Southampton Island (*See* Manning *in* Bray, 1943) are of this species. As yet, no cliff colonies are known on the Bell Peninsula section of Southampton Island, but the Expectation Point specimen suggests that *L. thayeri* may nest on the northern side of that peninsula, where there may well be suitable cliffs.

five *thayeri* from the south side of Dolphin and Union Strait or in the single *L.a. smithsonianus* from Great Bear Lake, less than 200 miles southwest. Eight specimens from Devon Island are obvious *thayeri*, and another seven from Mill Island and southern Baffin Island, including two from Lake Nettilling are typical *L.a. smithsonianus*, but one unsexed bird taken at Pond Inlet (north Baffin Island) on August 24, and a female from Piling (northeast Foxe Basin), taken on September 3, are somewhat intermediate and suggestive of possible intergradation in that region. The National Museum also has three other adults which cannot satisfactorily be placed with either *L.a. smithsonianus* or *thayeri*. One from Cape Fullerton (northwest Hudson Bay) is unsexed and was taken on June 15. The others are females and were taken on August 20 at Moisie Bay, southern Quebec, and on September 16, at Younghall, New Brunswick. These five doubtful specimens have not been included in the table of measurements.

In view of the above facts, it seems wise to follow Salomonsen and separate *thayeri* and *argentatus* specifically. The relationship of *thayeri* with *L.g. kumlieni*[1] is even less clear since as far as is at present known, the breeding area of the latter, which extends along the coast from a little west of Cape Dorset to Cumberland Sound (Soper, 1946) is geographically isolated from *thayeri* (Soper, 1946; Wynne-Edwards, 1952b). However, there is no obvious reason to think that *thayeri* is more closely related to *L.g. kumlieni* than to *L.a. smithsonianus*. In size (Table XXXVI) and in wing colour and pattern it is approximately intermediate, but the colour of its mantle averages darker than in either of its relatives. Eye colour also suggests that *kumlieni* may not be directly derived from *thayeri*, or even from a common ancestor closer than *L. argentatus*. In *L.a. smithsonianus* the iris is unmarked pale yellow or straw coloured; in *thayeri*, it "varies from straw-color, thickly powdered with brown or greyish specks, to pale brown, freckled with darker" (Brooks, 1937). The labels on four east coast winter *L.g. kumlieni* specimens in the National Museum taken by R. W. Smith give the iris as pale yellow (one adult ♀), yellow brown (two, third (?) year ♀♀), straw yellow (one, second (?) year ♀). According to Brooks (1937), the eye ring colour of adults is as follows: *L.g. kumlieni*, dark scarlet red in summer and winter; *thayeri*, purplish pink in summer and winter; *L.a. smithsonianus*, yellow deepening to orange red 'according to some observers' in the breeding season. *L.g. kumlieni* may also perhaps be distinguished by the colour of the legs, which, according to Wynne-Edwards (1952), are a "rather deep color, perhaps brownish-pink." Taken separately, there is an overlap in the characters, wing patterns, wing colour, and mantle colour, which distinguish *thayeri* from *kumlieni*, but when these characters are considered together there can be no doubt to which any of the adult specimens in the National Museum belong. Of the two doubtful specimens mentioned by Rand (1942), that from Cornwallis Island is typical of *thayeri* in all measurements, but has unusually pale, though by no means unusually restricted, wing markings. The area from which it was taken strongly suggests that these pale markings do not necessarily indicate intergradation with *L.g. kumlieni*. The Churchill bird, probably *L. thayeri*, is not fully adult.

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[1] The relationship of Kumlien's and the Iceland Gulls is beyond the scope of this paper, and the A.O.U. Check List (1945) is therefore followed, but it will be noted that Wynne-Edwards (1938, p. 45) considered that in life Kumlien's Gull does not differ greatly from the Herring Gull except in the paler pigmentation of the primaries, whereas they were "obviously different from Iceland Gulls on any but the most superficial examination."

TABLE XXXVI

Measurements of Adult *Larus thayeri*, *L. argentatus smithsonianus* and *L. glaucoides kumlieni*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Flattened wing					Flattened wing				
L. thayeri	18	384-431	416.5 ± 2.7	11.3	2.7 ± .45	6	386-420	401.2	—	—
L.a. smithsonianus (all specimens)	32	419-453	435.4 ± 1.4	8.2	1.9 ± .24	24	405-431	416.3 ± 1.4	6.8	1.6 ± .24
L.a. smithsonianus (James Bay)	7	424-453	437.6	—	—	5	407-422	415.8	—	—
L.a. smithsonianus (Southampton I.)	8	423-448	438.0	—	—	2	405-424	414.5	—	—
L.g. kumlieni	6	409-420	414.1	—	—	6	379-394	392.8	—	—
	Exposed culmen					Exposed culmen				
L. thayeri	18	44.0-53.9	49.06 ± .64	2.71	5.5 ± .92	6	44.0-49.4	46.8	—	—
L.a. smithsonianus (all specimens)	32	51.3-61.3	57.03 ± .41	2.32	4.1 ± .41	23	47.7-56.2	50.70 ± .44	2.13	4.2 ± .62
L.a. smithsonianus (James Bay)	7	55.6-61.3	58.4	—	—	5	50.6-55.3	52.2	—	—
L.a. smithsonianus (Southampton I.)	8	53.7-58.0	56.1	—	—	2	50.0-52.0	51.0	—	—
L.g. kumlieni	6	42.0-44.8	43.6	—	—	6	36.3-41.0	39.1	—	—
	Depth of bill at distal extremity of lateral feathering					Depth of bill at distal extremity of lateral feathering				
L. thayeri	18	14.5-17.5	16.25 ± .19	.81	5.0 ± .83	5	14.6-16.5	15.3	—	—
L.a. smithsonianus (all specimens)	32	16.9-20.0	18.36 ± .14	.80	4.3 ± .54	22	15.2-17.8	16.17 ± .17	.77	4.8 ± .72
L.a. smithsonianus (James Bay)	7	17.0-20.0	18.4	—	—	5	15.3-15.6	15.4	—	—
L.a. smithsonianus (Southampton I.)	8	16.9-19.0	18.2	—	—	2	16.2-17.6	16.9	—	—
L.g. kumlieni	6	14.9-16.5	15.7	—	—	6	12.7-14.0	13.4	—	—
	Tarsus					Tarsus				
L. thayeri	18	58.7-65.8	62.77 ± .48	2.12	3.4 ± .56	7	54.9-66.7	59.6	—	—
L.a. smithsonianus (all specimens)	33	62.4-70.8	66.94 ± .36	2.07	3.1 ± .38	24	57.4-66.3	62.48 ± .45	2.18	3.5 ± .51
L.a. smithsonianus (James Bay)	7	63.6-69.5	67.0	—	—	5	58.8-64.3	61.3	—	—
L.a. smithsonianus (Southampton I.)	8	62.4-70.7	66.5	—	—	2	61.0-63.0	62.0	—	—
L.g. kumlieni	6	56.7-62.8	60.0	—	—	6	52.0-57.3	54.9	—	—

Origin of specimens. *L. thayeri:* Banks Island, 4 ♂♂, 3 ♀♀; Victoria Island (Walker Bay), 3 ♂♂, 1 ♀; Dolphin and Union Strait, 1 ♂, 1 ♀; Coronation Gulf, 1 ♂, 1 ♀; Cornwallis Island, 2 ♂♂; Devon Island, 5 ♂♂, 1 ♀; Frozen Strait, 2 ♂♂. All taken between June 5 and August 27. *L.a. smithsonianus:* Alaska, 1 ♀; Yukon Territory, 4 ♂♂, 7 ♀♀; Saskatchewan, 1 ♀; central Mackenzie District, 3 ♂♂; southeast Keewatin District, 1 ♂; Manitoba, 1 ♂, 2 ♀♀; Baffin Island, 2 ♂♂, 1 ♀; Mill Island, 2 ♀♀; Southampton Island including Frozen Strait, 8 ♂♂, 2 ♀♀; Ungava Bay, 2 ♂♂; James Bay, 7 ♂♂, 5 ♀♀; southern Quebec, 4 ♂♂, 3 ♀♀; Nova Scotia, 1 ♂. All taken between May 16 and September 3. *L.g. kumlieni:* South coast Baffin Island, 4 ♂♂, 2 ♀♀; Nova Scotia, 1 ♂, 2 ♀♀; New Brunswick, 1 ♂, 2 ♀♀. Taken throughout the year.

Without more specimens of known parentage, attempts to separate subadults are likely to be only partially successful (Cf. Rand, 1942). In *thayeri* at least there appears to be a remarkable individual variation (Cf. Brooks, 1937). Two specimens from Cape Kellett, taken on September 6 and 17, 1914, have Drab tails and mottling, whereas the mottling on the Mercy Bay bird taken on August 21, 1953, is Hair Brown, and its tail is almost Fuscous. This bird still had a little down adhering to its neck, and was taken with an adult *L. thayeri*, which was almost certainly its mother. The difference in the mottling is actually rather greater than is apparent from the comparison of Drab and Hair Brown in Ridgway (1912), and certainly more than would be expected from museum age or fading in the field. Moreover, since the tail is involved, it cannot be due to the partial postjuvenal moult[1].

***Rissa tridactyla**, subsp., Kittiwake

Armstrong (1857, p. 347) says there were three distinct species of gull, "*Larus Glaucus*, *Larus Argentatus*, *Larus Tridactylus*" at the Princess Royal Islands on June 8, 1851. He also lists (p. 602) *Larus tridactylus* amongst the specimens collected during the voyage in the polar sea, and Richardson (1828, p. 237) records it breeding in great numbers near Cape Parry on the mainland south of Banks Island. However, there are no modern records for this area, and until more evidence is available, the above must remain suspect. The Atlantic Kittiwake, *R.t. tridactyla*, was common off the southern coast of Cornwallis Island in 1947 (Duvall and Handley, 1948), and specimens have been taken at Bellot Strait and Port Leopold, Somerset Island (Shortt and Peters, 1942). The Pacific form, *R.t. pollicaris*, occurs commonly at Point Barrow, and Bailey (1948) suggests that some might be migrants from colonies far to the east, although there appear to be no records along the north coast of Alaska.

Xema sabini sabini (Sabine), Sabine's Gull, *Ichi gi giak* or *Nauiarat Kchusialuk*

Sabine's Gulls are scarce on eastern Banks Island but common along the low western coast throughout the summer, and it is probable that they nest in the latter area. However, the only young birds seen on Banks Island were two, unaccompanied by adults, on the north coast on August 29, 1953, within a mile or two of Russell Point, and one with two adults about 12 miles south of Russell Point on August 31. All these young birds could fly well, and were not necessarily local birds. As yet, however, there appear to be no definite records for the Sabine's Gull north of M'Clure Strait, but Stefansson (1921, p. 365) mentions two kinds of 'terns' on Melville Island. The larger, 'black headed' kind were almost certainly Sabine's Gull. In

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[1] Since the above was written, three specimens in the British Museum collection have been examined: one, from Igloolik Island, No. 1947.6.39, taken August 23, 1937, and one, 1947.6.41 (T. H. M. 159), taken mid-August 1937, from Canyon River, northeast coast of Southampton Island, have Drab mottling and Drab to Hair Brown tail; the third, 1947.6.40, taken on September 3, 1937, at Abadyar Island near Igloolik, is distinctly paler, the mottling, wings, and tail being Drab-Gray to Light Drab.

No downy young were secured on Banks Island, but two from the head of Bajain Inlet and one from White Island, Frozen Strait, in the British Museum collections, are almost certainly referable to *L. thayeri*. Compared to five *L. a. smithsonianus* of similar age from the mouth of Boas River, Southampton Island, the three *L. thayeri* have more white on the breast and belly, slightly less distinct spotting, and slightly less buffy tinting on the back. It is doubtful, however, if all individuals in a mixed series could be correctly separated.

TABLE XXXVII

Measurements of Adult *Xema sabini sabini*

		Flattened Wing			Bill from nostril			White on 7th primary[1]		
		No.	Extremes	Mean	No.	Extremes	Mean	No.	Extremes	Mean
Alaska[2]	♂	3	260-288	274.7	3	11.3-13.8	12.93	3	37-40	39
	♀	3	261-287	273.7	2	12.0-13.7	12.85	3	15-36	25
Banks I.	♂	5	268-280	274.6	5	14.0-14.6	14.24	5	08-50	34
	♀	3	267-277	273.7	3	13.0-14.0	13.50	3	18-40	31
Baillie I., Bernard H., S. Victoria I.	♂	6	270-289	278.3	5	12.9-14.0	13.32	6	33-62	43
Bernard H.	♀	6	265-283	271.5	6	12.0-14.0	12.78	6	07-34	24
Baffin I.	♂	7	267-288	276.7	6	13.7-15.2	14.37	7	20-46	36
	♀	2	264-272	268.0	2	13.1-14.7	13.90	2	40-47	43

Origin of specimens. *Alaska* (north coast), 3 ♂♂, 3 ♀♀. All taken between June 25 and August 25. *Banks Island*, 5 ♂♂, 3 ♀♀. All taken between June 15 and July 27. *Baillie Island*, 2 ♂♂ (June 20). *Bernard Harbour*, 2 ♂♂, 6 ♀♀ (June 14 to 26). *Victoria Island* (Austin Bay), 2 ♂♂ (July 25). *Baffin Island* (Cape Kungovik), 7 ♂♂, 2 ♀♀ (June 19 to 26).

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[1] This was measured from where the black base of the 7th (6th functional) primary terminates on the outer border of the feather to the tip of the feather. If the black spot, distal to the main black base, touched the outer border, the two lengths of white border were measured separately and added together. All measurements were made on the left wing.

[2] Point Barrow, 1 ♂, Barter Island, 2 ♂♂, 2 ♀♀, Manning Point, 1 ♀.

the east a Sabine's Gull was shot at the extreme north of Ellesmere Island (MacMillan, 1927, p. 255). Our canoe trip up the west coast of Banks Island in August 1952 was probably too early for us to see young birds on the wing, although some might have been expected by August 10 between Storkerson Bay and Bernard Island. On our walk up that coast in late June and July, 1953, we avoided the marshes, and it would have been possible for us to miss nesting colonies. The lake-filled valley of the Big River, which we passed on the sandbars and on the sea-ice, is one of the most suitable nesting places. The total population of Banks Island is estimated to be 25,000.

In 1952, the first Sabine's Gulls were seen at De Salis Bay on June 14. The 11 recorded there between that date and July 17 were evidently not breeding. In 1953, they were first seen in the Sachs Harbour area and at Cape Kellett on June 2. In the latter region they were most abundant at the mouth of Kellett River, where 150 were seen in a 10-hour walk on June 16. On August 1, 1952, flocks of adult birds numbering up to 250 in a flock and totalling about 1,000 were seen from the canoe along the 3-mile stretch of shore just north of Cape Kellett, but none were observed on an overland walk from there to the south coast later that day. In 1953, they had evidently commenced to flock by July 27, when 60 were seen together at Sachs Harbour.

No Sabine's Gulls were seen on the coast north of Bernard Island in 1952. Next year they were observed along the valley of the Bernard River almost to the extreme head of the northwest tributary, but not in the valleys of the rivers flowing down to the north coast.

The Banks Island specimens agree well with nine birds from Camp Kungovik, Baffin Island, and are therefore presumably referable to *X.s. sabini*. Indeed, no trend toward *X.s. woznesenskii*, of western Alaska, or the apparently intermediate form, *X.s. tschuktschorum*, can be seen in any of the characters postulated by Portenko (1939). There is a fair amount of individual variation in the colour of the back and head, particularly the latter, in both eastern and western birds. Although no real fading or foxing of the older specimens is evident[1], the new Banks Island specimens certainly have a rather brighter, fresher appearance than most of the others, including those from Baffin Island, which were taken in 1929. Seven of the Banks Island specimens were made up in the field; the eighth was salted. No colour change due to washing is apparent in this bird. Table XXXVII shows the variation in length of the stretched wing, the bill measured from the nostril, and the amount of white on the outer border of the 7th primary. The apparent agreement in bill length between the Banks Island and Baffin Island specimens, and the difference between these and the Alaskan, western arctic mainland, and Victoria Island birds is presumably due to the chances of sampling. It was found that all the females except one Baffin Island specimen[2] had either an isolated spot of black on the 7th primary of one or both wings, or a patch of black joined to the main black portion by a narrower neck of black. In the males, only three specimens, one from Banks Island, one from Bernard Harbour, and one from Camp

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[1] Except, perhaps, four of the Alaskan specimens, which are rather dirty and may have suffered in the field.

[2] This bird differed from all the others in that the black faded gradually through grey to white on the 7th primary.

Kungovik had this black patch. The sexes may therefore be distinguished in most cases by this character. Occasionally the black patch may be on one wing only.

The weights of specimens taken in 1953 at Sachs Harbour were: ♂, June 10, 175 gm.; ♀♀, June 12, 155 gm.; July 27, 166 gm.

Sterna paradisaea Pontoppidan, Arctic Tern, *Imetkchoteilak*

The Arctic Tern has been found breeding at the extreme north of Ellesmere Island (MacDonald, 1953), and a few birds may be expected throughout the arctic islands wherever conditions, including some open water, are suitable. They seem to be scarce on the eastern side of Banks Island, but moderately common along the west coast, where a few evidently nest on some of the sandbars and small islands. Inland, the population appears to decrease rapidly. In 1949, however, Porsild (1951) saw a few Arctic Terns on most lakes, and daily from his camp, 25 miles west of Russell Point, so that some may nest in the lakeland country of the upper Bernard and Thomsen rivers. Making no allowance for this, the total adult population of Banks Island is estimated to be only 10,000.

In 1952, a few casual wanderers were seen in the De Salis Bay region after June 14. In 1953, the first two Arctic Terns were seen at Cape Kellett on June 2, after which only two more were observed near the Cape. The other 30 recorded for the region were near the mouth of Kellett River. None were seen at Sachs Harbour until June 13. On July 7, a nest with two fresh eggs was found on a sandbar between Storkerson Bay and the Adam River. On July 27, a pair (collected) with two downy young (one collected: grey-phased, one to three days old) were seen on an islet in Sachs Harbour. In the preceding year 50 adults were seen on August 3 at Terror Island, where they may have nested, although we saw no sign of any young or pronounced defensive behaviour.

Table XXXVIII divides the available specimens of Arctic Terns into those which may be expected to migrate south over the Atlantic and those which probably follow the Pacific Coast. In wing length there is clearly no significant difference between the two groups, but the culmen length of the western specimens is significantly less in both sexes: 1.95 mm., $t = 2.9$, $P < .01$ for the males, and 1.27 mm., $t = 2.3$, $P < .05$ for the females. The tarsus of the western birds also is shorter. The difference, .97 mm., for males is again significant: $t = 3.4$, $P < .01$. In the females, the difference is only .42 mm., $t = 1.7$, P about .1. However, this is primarily because of the single Ellesmere Island specimen from Parr Inlet, with a culmen of 14 mm., the shortest in the series. If this specimen is omitted, the mean for the eastern females becomes $15.86 \pm .15$ mm., and the difference, .54 mm., is also significant ($t = 2.45$, P about .02). Since this Ellesmere Island bird also has a small bill, 28.5 mm., it is not unlikely to be a wanderer from the west. Three of the Ellesmere Island males would also fit much better in the western series, and the mean total culmen and tarsus lengths of all seven specimens from there are only 30.86 mm. and 15.45 mm. respectively. The difference between the eastern and western series would therefore be greater were the Ellesmere Island specimens omitted. The explanation may be that terns from both the Atlantic and the Pacific occur on Ellesmere Island. Possibly they breed in different localities, or one form may occur chiefly as non-breeding wanderers.

TABLE XXXVIII

Measurements of Adult *Sterna paradisaea*

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
			Flattened wing					Flattened wing		
Western	8	264-277	270.9 ± 1.9	5.3	1.9 ± .49	15	256-276	265.8 ± 1.9	7.3	2.7 ± .50
Eastern	33	247-282	269.8 ± 1.2	6.9	2.6 ± .32	16	254-280	266.4 ± 1.7	6.9	2.6 ± .46
			Total culmen					Total culmen		
Western	8	28.7-32.4	30.87 ± .48	1.37	4.4 ± 1.11	14	28.0-31.8	30.25 ± .30	1.11	3.7 ± .70
Eastern	32	29.5-36.3	32.82 ± .30	1.70	5.2 ± .65	16	28.5-35.3	31.52 ± .43	1.72	5.4 ± .96
			Tarsus					Tarsus		
Western	8	14.3-16.0	14.98 ± .18	.50	3.3 ± .83	15	14.2-16.3	15.32 ± .15	.57	3.7 ± .68
Eastern	33	14.8-18.0	15.95 ± .13	.75	4.7 ± .58	16	14.0-17.0	15.74 ± .18	.73	4.6 ± .82

Origin of specimens. *Western:* North coast of Alaska, 3 ♀♀; British Columbia, 2 ♀♀; Yukon, 2 ♂♂; Cape Bathurst, 3 ♀♀; Banks Island, 4 ♂♂, 2 ♀♀; Victoria Island, 1 ♀; Dolphin and Union Strait, 1 ♀; Great Bear Lake, 2 ♀♀; headwaters of the Hanbury River, 1 ♂, 1 ♀; Lake Athabasca, 1 ♂. Mostly taken in June and July. *Eastern:* Ellesmere Island (Parr Inlet), 3 ♂♂, 1 ♀, (Slidre Fjord), 2 ♂♂, (Ravine Bay), 1 ♂; Greenland (Godthaab), 7 ♂♂; Baffin Island (south), 1 ♂, 1 ♀; Hudson Bay (south, west), 4 ♂♂, 3 ♀♀; James Bay, 8 ♂♂, 4 ♀♀; Quebec (south), 1 ♂, 1 ♀, (north), 1 ♂, 2 ♀♀; Prince Edward Island, 1 ♂; Nova Scotia, 5 ♂♂, 3 ♀♀. All taken between May 28 and August 28.

It seems possible that with good series from more distinctly eastern and western areas, morphological differences might be found to justify the subspecific separation of the Atlantic and Pacific populations, the distinctness of which is indicated by their markedly different migration routes (*See* Lincoln, 1939, figure 8).

The weights of an adult male and a female taken at Sachs Harbour on July 27, 1953, were 97 gm. and 96 gm. respectively.

***Plautus alle alle** (Linnaeus), Dovekie

According to the Eskimos' description, some of the 'Sea Ptarmigan' which they occasionally see at the floe in winter and early spring are very small and may be this species. It is common as far west as Barrow Strait (Duvall and Handley, 1948). There is a single definite record for Point Barrow (Bailey, 1948), and a specimen was taken near Melville Island in August (Swainson and Richardson, 1831, p. 479). Gavin (1947) saw one, freshly killed but partly eaten, near Perry River in late November, 1940.

***Uria lomvia** subsp., Thick-billed Murre

An Eskimo, Lennie, now dead, but well known on Banks Island, told Clarke (1944) that murres were one of the component species of the large bird colony on Nelson Head. It appears that this must have been a misunderstanding. No murres were seen at Nelson Head during the brief visit on September 4, 1951, although they had been seen on the mainland at Cape Parry a week before. Again, in late July, 1952, which would be the middle of the breeding season, no sign of murres was observed along any of the south coast of Banks Island, nor was any other bird colony seen at Nelson Head, although farther east there were several Glaucous and Thayer's Gull colonies. However, in late winter and spring, the Eskimos sometimes see, at the floe opposite Sachs Harbour, birds of varying size which they lump together as 'Sea Ptarmigan'. It is probable that some of these are the Thick-billed Murres which nest at Cape Parry. The race represented is not known. Anderson (1913, p. 458) refers a specimen taken at Herschel Island to *U.l. arra*, but there seem to be no other records east of Point Barrow, although a considerable number of murres have been observed migrating past there in spring and autumn (Bailey, 1948). The most westerly records for *U.l. lomvia* appear to be from Prince Regent Inlet (Shortt and Peters, 1942) and Barrow Strait near the southern entrance to Wellington Channel (Duvall and Handley, 1948).

Cepphus grylle subsp., Black Guillemot

A single Black Guillemot was seen just south of Cape Prince Alfred on August 10, 1952, by Manning and Macpherson. It is probable that some, perhaps most, of the 'Sea Ptarmigan' which the Eskimos see at the floe off Sachs Harbour in winter and early spring are this species. The race most likely to occur about Banks Island is doubtful. Storer (1952, figure 17) shows the distribution of *C.g. mandtii* as far east on the mainland coast as Cape Bathurst, but he does not appear to have examined any specimens or to have cited any records for the species west of Barrow, where it is common but is not definitely known to breed (Bailey, 1948). *C.g. ultimus* occurs westward as far as Somerset Island (six specimens, Storer, 1952, p. 199).

Nyctea scandiaca (Linnaeus), Snowy Owl, *Ugpik*

The density of the Banks Island Snowy Owl population is evidently dependent on the stage of the lemming cycle. In 1949, when lemmings were scarce, Porsild (1951) saw only one Snowy Owl, although he says that, judging from the number of perches, they must have been plentiful at times of lemming abundance. On August 27, 1951, Manning and Macpherson saw three Snowy Owls in half an hour's walk on a ridge behind Sachs Harbour, and at De Salis Bay on September 2 there was at least one to a square mile. At both places, numerous recently dug burrows showed that lemmings had been plentiful in the spring, although there had evidently been a severe decline during the summer. Next summer, both species of lemming were at a low point of the cycle, and owls were scarce (about one to 10 square miles in the De Salis Bay region), and probably not nesting. In 1953, lemmings were on the increase, and in some areas already abundant. One of these areas was between Castel Bay and Mercy Bay, and another, to the east of Mercy Bay about Back Point. At these two places there was one adult owl to about a square mile in 1953, whereas in the former region there had been only one to 10 square miles in 1952. Thus the 1951–52 conditions at De Salis Bay were reversed. It seems unlikely that the breeding Snowy Owl population is ever much denser than one owl per square mile, but it is probable that when lemmings are at a peak throughout Banks Island, the owl population may reach this density over much of the island. The mean population for 1952 and 1953 is estimated to have been 5,000. Some years, for instance 1952, it is probably only 2,000; in others, perhaps 1951, it may reach 15,000 or 20,000.

A number of owls were seen by members of M'Clure's expedition between 1851 and 1853 (Armstrong, 1857, pp. 321, 432, 434, 504). The first, in 1851, was at the Princess Royal Islands on May 8. Others were recorded at Ballast Beach in mid-September of that year, one at Mercy Bay on March 1, 1852, and some in the middle of the following winter. In the summer of 1914, owls were very numerous on southwest Banks Island, but gradually became scarcer toward Christmas, and one seen on February 20 just north of Cape Kellett was a surprise to Stefansson (1921, p. 345). At Cape Kellett, two semi-downy specimens were collected by G. H. Wilkins on September 5, 1914, and two more on September 8. In the same year, he also collected probable yearlings dated September 26, October 13, November 20, December 8, and an adult dated October 5 (N.M.C. specimens). Snowy Owls were again numerous in early August, 1917, when Stefansson's party found a nest almost every day during their walk from Russell Point to Cape Kellett (Stefansson, 1921, p. 640). The Eskimos sometimes see a few Snowy Owls on Banks Island in the winter, but it is unlikely that any remain at that season in poor lemming years. In 1952, we saw no owls at De Salis Bay until June 5. The next year one was seen at Sachs Harbour on May 19, and one or more regularly thereafter. At Cape Kellett they were first observed on May 29, when six were recorded.

We saw no evidence of nesting owls in 1952, but next year the majority appeared to be breeding. On June 29, 1953, a nest (which was a mere scrape on top of a grassy hummock) with three eggs was found in a fairly marshy area near some Black Brant nests on the north side of Kellett River. About 3 miles from there a pair of owls was seen on July 18 doing vigorous distraction display. They appeared to have killed several adult or yearling Black Brant (*See* under that species), a larger prey than any mentioned by Bent (1938). At Castel Bay, an owl was also seen to attack a wounded but still flying Rough-legged Hawk and to drive it toward the ground. When found half an hour later, the hawk had a broken humerus. Flight in this condition would not appear possible, but the bone may have been cracked by the shot which originally wounded the bird, and broken completely while attempting to avoid the owl or in landing. On July 17, a nest with five young owls (Plate VI B) was found on a rather bare slope about 15 miles inland from the head of Castel Bay. The smallest nestling, still in complete white down, and the largest, which was growing its second (darker) down, were collected. In the Back Point region between August 14 and 19, nine young owls, probably representing three broods, were seen. They were unable to fly (frontispiece) but progressed rapidly over the ground in a series of jumps aided by flapping wings. When cornered, they made a hissing sound and also a loud clacking noise with their bills similar to the snapping of teeth. It was a formidable performance, and on one occasion an Eskimo dog was kept at bay for three or four minutes. However, when handled, the owls were docile and made no attempt to scratch or peck.

Bent (1938) gives the colour of the second down of young Snowy Owls as Hair Brown to Drab. The down of the flightless young female taken on August 14 at Back Point is between Hair Brown and Mouse Gray, but nearer the former. It closely matches two slightly younger unsexed birds taken at Cape Dorset, Baffin Island, on July 20, 1926. A female, taken by the Canadian Arctic Expedition at Cape Kellett on September 5, 1914, and similar in size to the Back Point bird, is more Drab and may have foxed. A male from Pangnirtung, July 20, 1926, and another from Cape Kellett, September 8, 1914, slightly younger and slightly older respectively than the Back Point bird, are decidedly paler, Drab to Light Drab. In view of the whiter plumage of most adult males, this may be a sexual difference. Another unsexed semi-downy from Cape Kellett, September 5, is somewhat intermediate.

Asio flammeus flammeus Pontoppidan, Short-eared Owl, *Kcherneklualuk Ukpik*

A moderate-sized, dark-coloured owl seen in the distance in the Masik Valley by Manning on June 18, 1952, was almost certainly this species. On June 2, 1953, Höhn saw two together between Sachs Harbour and the Kellett River, and one by itself about a mile east of Sachs Harbour. On June 15, he saw another at very close range south of the Sachs River.

It would not be surprising if occasional pairs of Short-eared Owls nested on Banks Island. They breed on the barrens and sparsely wooded areas of Fort Anderson (MacFarlane, 1908; Preble, 1908), and there are four specimens in the National Museum taken on the arctic coast between Richards Island at the mouth of the Mackenzie River and Dolphin and Union Strait. There do not appear to be any other records for the western arctic islands, but Kumlien (1879) apparently found it nesting in the Cumberland Sound area of Baffin Island. Salomonsen (1950–1) mentions 33 Greenland records, although there is no definite evidence of its nesting there.

Eremophila alpestris hoyti (Bishop), Hoyt's Horned Lark

The Horned Lark has been recorded on Prince Patrick Island (MacDonald, 1954) but apparently not as yet on any of the other Queen Elizabeth Islands. On Banks Island it is a fairly common summer resident and probably nests in all suitable areas. The total summer adult population of the island is estimated to be 100,000.

In 1949, Porsild (1951) collected a juvenal about 25 miles west of Russell Point. In 1951, Macpherson saw four Horned Larks (one collected) on August 26 at Wolley Point during a three-quarter-hour walk. In 1952, they were first seen at De Salis Bay on May 23, and in 1953 at Sachs Harbour and Cape Kellett on May 16. On June 14, 1952, Horned Larks and ptarmigan were the only two species remaining on the dry, sparsely vegetated mud and gravel ridges at De Salis Bay. From June 2 to July 1 in the same year, almost all Horned Larks were in pairs and were either nesting or preparing to nest. At Sachs Harbour a nest with five young was found on June 16, 1953, and on June 18, one with four eggs. In 1952, the first young were seen on the wing in the Nelson Valley on July 25, and in 1953 on July 20 at Sachs Harbour.

On May 21, 1953, there was a sudden influx of Horned Larks at Sachs Harbour, 20 or more being seen at a time within the settlement. After May 23, the numbers returned to normal, but on May 29 they were particularly abundant between Mary Sachs and Sachs Harbour, about 300 being seen in seven hours.

Sixty-three out of 65 of our adult-plumaged Banks Island specimens have pale yellow throats, white superciliary stripes, and white or near white auriculars, closely matching specimens in the National Museum from the central mainland arctic coast and also a series from northern Melville Peninsula. They are definitely referable to *E.a. hoyti*. One white-throated, and one dark-yellow-throated specimen with yellow superciliary stripe, differ in other characters from *E.a. articola* and *E.a. alpestris*, and are therefore considered aberrant *E.a. hoyti* of local origin, though it is possible that the latter specimen is a descendant of a stray *E.a. alpestris*. A more detailed discussion of the three northern races of Horned Larks will be published elsewhere.

The weights of adult specimens taken at Sachs Harbour were as follows: ♂♂: May 16, 40 gm.; June 24, 39 gm.; July 21, 42 gm.; ♀♀: May 30, 41 gm.; June 12, 44.7 gm.; June 24, 41 gm. Juvenals taken on July 20 and July 23 weighed 38 gm. and 39 gm. respectively.

Corvus corax principalis Ridgway, Northern Raven, *Tulugak*

The Northern Raven ranges throughout the arctic islands. On Banks Island it is the scarcest of the regular inhabitants, and the total summer population, which presumably includes birds of the year, is estimated to be only 400.

Doubtless the Raven nests on Banks Island, but the Eskimos could not recall finding any nests. A few remain throughout the winter, at least in some years, and the *Investigator*, while frozen in the ice near the Princess Royal Islands, was visited almost daily during the first part of the winter of 1850–51 by two Ravens which went back and forth over Prince of Wales Strait. One was killed, but two were again seen at the Princess Royal

Islands when the *Investigator* passed there on June 16, 1851. Ravens were also seen near Ballast Beach on September 10 and 18 of that year (Armstrong, 1857, pp. 290, 378, 427, 434). A doubtful female in the National Museum was taken at Cape Kellett by G. H. Wilkins on September 17, 1914.

Two Ravens frequently seen in the Sachs Harbour area in 1953 were repeatedly mobbed by a Rough-legged Hawk which had a nest near the settlement. In the spring and early summer of that year, Ravens were not attracted to the fox and seal carcasses at Sachs Harbour settlement, although two or three had often been seen feeding on the garbage there in the preceding September.

Anthus spinoletta rubescens (Tunstall), American Pipit

The American Pipit is an uncommon bird on Banks Island and was recorded in only a few places, all during the breeding season, in the vicinity of the coast, although there appeared to be suitable nesting territory in several places, such as the borders of the valleys of the Masik, Nelson, Muskox, and Thomsen rivers.

On July 14, 1952, five Pipits were seen in a gully which cut the mud cliffs near Milne Point. Four of these were close together and were thought to be two nesting pairs. In 1953, one Pipit was seen near the Cape Kellett bluffs on June 10, three on June 19, and one near Sachs Harbour on June 16. Along the north coast they were more common. In 1952, four migrants were seen at Antler Cove between August 14 and 15, one at Mahogany Point on August 27, and seven near the Muskox River on September 3. In 1953, 51 Pipits were counted at Mahogany Point between July 20 and August 8, but most of these were seen in one area near the rocky Beacon Hill, which was frequently passed, so that the same birds were counted on different days. Probably about 10 pairs were nesting near that hill, and a few pairs near the cliffs and steep slopes on the east side of Castel Bay. On the basis of the numbers we recorded, the total population of Banks Island is only about 20,000, but it is possible that considerably more may nest along the north and east coasts between Mercy Bay and Milne Point, an area not visited in the breeding season.

Twelve late April and May and five July and early August specimens from British Columbia and Alberta are not distinguishable by the colour of the underparts from six May specimens from Manitoba and James Bay, and 34 June, July, and early August specimens from south Hudson Bay, James Bay, and Baffin Island. However, the backs of most of the western spring birds are paler and more sandy, with rather browner wings and tails, the latter character being still discernible in the summer specimens (Cf. Todd, 1935). The single June and July Banks Island specimens, which are remarkably unworn, closely match the eastern spring and summer series of *A.s. rubescens*, as does also a May specimen from the Mackenzie Delta, an early August specimen from western Victoria Island, and five other summer birds from the central arctic coast. Four July Canol Road and three June Chitina Glacier birds are intermediate. One June specimen from Point Collinson, Alaska, is closer to *A.s. pacificus*. The 94 fresh autumn skins in the National Museum taken from across Canada were selected without reference to the labels according to the colour of the back, Sepia versus Saccardo's Umber, the criterion given by Todd (1935) for the separation of the races. The result is shown in Table XXXIX. The Sepia Yukon specimens are comprised of four from Herschel Island, two from the Canol Road, and one from Mount Montana in the extreme south of the Territory. The Saccardo's Umber Yukon specimen is also from Mount Montana. The 19 specimens from the Northwest Territories were taken from the following places: Baffin Island, 10; Chesterfield, 1; Thelon River, 2; Artillery Lake, 1; Coronation Gulf, 1; Victoria Island, 3; Banks Island, 1. The Unalaska, northern Yukon (including the Canol Road (Cf. Rand, 1946)) and western Northwest Territories specimens are as dark and brown as the Baffin series, and it is clear that *A.s. rubescens* extends across all northern Canada and probably a considerable part of Alaska, perhaps including the supposed range of *A.s. geophilus*, which, from Oberholser's description (1946), appears to resemble it. The rather high proportion of the Saccardo's Umber specimens amongst the British Columbia and Alberta series may be explained in part by migrant *A.s. rubescens* from the north, since all the dark specimens from Alberta and four of those from British Columbia were taken between August 29 and September 30. The few juvenal specimens seen (none from the western Canadian Arctic) appear to show the same racial characteristics as the autumn birds and might prove very useful for delimiting the races.

TABLE XXXIX

Fresh Autumn Specimens Selected According to Colour of the Back

	Unalaska	B.C.	Alta.	Sask.	Yukon	NWT	Man.	Ont.	Que.
Saccardo's Umber, *A.s. pacificus*.....	—	9	10	9	1	—	1	—	—
Sepia, *A.s. rubescens*.....	2	6	4	1	6	19	9	16	1

Seiurus noveboracensis notabilis Ridgway, Grinnell's Water-Thrush

An unsexed Grinnell's Water-Thrush in the National Museum (cf. Anderson, 1917) taken by the Canadian Arctic Expedition at Cape Kellett on September 11, 1914, still appears to be the northern record for the species.

Setophaga ruticilla tricolora (Müller), Northern American Redstart

A young redstart was collected near the houses at Sachs Harbour on September 19, 1952. Ross (1862, p. 145) reported the species north to Fort Good Hope, but a specimen taken by Preble (1908) at Fort Norman appears to have been the most northern positive record.

Junco hyemalis hyemalis (Linnaeus), Slate-colored Junco

A female Slate-colored Junco was collected at Sachs Harbour on May 23, 1953 (weight, 17 gm.). This appears to be the first record for the arctic islands other than Baffin Island (*See* Soper, 1946) and Southampton Island (*See* Sutton, 1932) and the northernmost record for the species, although it is common in the Mackenzie Delta and breeds beyond the tree limit (Porsild, 1943).

Junco oreganus montanus Ridgway, Montana Junco

An unusually dark-headed female Oregon Junco taken at Sachs Harbour on May 30, 1953, is tentatively referred to this race. The wing and tail, which are both badly worn, measure 73.5 mm. and 60 mm. It is of course well to the north of its normal range, and although Dwight (1918, p. 295) says it occurs far north in the Mackenzie valley, there appears to be no definite record for it (Miller, 1941, p. 335).

Spizella arborea ochracea Brewster, Western Tree Sparrow, *Saksinialuk*

The Tree Sparrow seems to be a regular wanderer to Banks Island, and it is possible that a few may nest in sheltered places. In 1952, a female was collected at De Salis Bay on June 1, and in 1953 one was seen at Cape Kellett on each of these days: May 18, 19, 29, June 5 (♂, 2 ♀♀ collected), and at Sachs Harbour on May 22, 24, and 30 (2 ♀♀ collected). This appears to be the first recorded occurrence of the species north of the mainland. Tree Sparrows may also be expected as wanderers and possible breeders in parts of western Victoria Island.

Although in worn spring plumage, the five southwestern Banks Island specimens may unhesitatingly be referred to the western race since the edges of the dorsal feathering are as pale as any in a series of 18 June and July specimens from Kluane Lake and the Canol and Haines roads, and distinctly paler than any in the equally large series from Ungava and James bays and the Ontario coast of Hudson Bay. The difference is most striking if the Banks Island birds are compared with eastern specimens of strictly comparable date, that is to say, early June before too much of the russet edgings have worn from the feathers. At this season, specimens of the western race, including those from Banks Island, besides being greyer, have a distinctly more worn appearance. The single De Salis Bay specimen is rather darker than the others, agreeing with four June specimens from Coppermine in being apparently intermediate between the eastern and the western race, but the actual boundary between the two races can only be determined by good series of fresh autumn specimens from the breeding range. The colour of the pileum is variable in both eastern and western birds and does not assist identification.

A specimen in autumn plumage taken at Churchill on August 15 agrees closely with one from Cape Tatnam, Manitoba, two from James Bay (August), and two from Ungava Bay (August–September), being the only autumn specimens from the eastern breeding grounds in the National Museum. A single female (August 27) from Bathurst Inlet is also closer to these than to the 13 autumn specimens of *S.a. ochracea* from the Alaska Highway and the Canol Road. Four June birds from Herchmer, 100 miles south of Churchill, are also typical *S.a. arborea*, but one late May and one June bird from Churchill tend towards *ochracea*[1]. The remaining breeding Churchill specimen agrees with those from Herchmer and the east. With one possible exception, six April and one September Saskatchewan migrants are definitely referable to *S.a. ochracea* (cf. Godfrey, 1950), as is a good series from Alberta. From Manitoba, two Whitewater Lake (April) and three Oak Lake (one March, two September) specimens are also referable to

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[1] No significance need be attached to this. They are probably merely aberrant *S.a. arborea*.

TABLE XL

Measurements of *Spizella arborea ochracea* and *S.a. arborea* in Breeding Plumage

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
Yukon (*S.a. ochracea*)...........	8	74-77	75.38 ±.25	.70	.9 ±.23	6	69-73	71.50 ±.39	.96	1.3 ±.39
Banks I. (*S.a. ochracea*).........	1	—	75	—	—	5	69-72	70.56	—	—
Hudson B., James B., Ungava B., (*S.a. arborea*)................	19	71-78	74.11 ±.42	1.83	2.5 ±.40	11	68-73	70.09 ±.39	1.31	1.9 ±.40
	Tail					Tail				
Yukon (*S.a. ochracea*)...........	9	64-71	67.45 ±.65	1.95	2.9 ±.68	7	61-65	62.86 ±.42	1.12	1.8 ±.48
Banks I. (*S.a. ochracea*).........	1	—	62	—	—	5	62-64	63.00	—	—
Hudson B., James B., Ungava B., (*S.a. arborea*)................	19	62-71	66.21 ±.54	2.33	3.5 ±.57	11	61-66	63.45 ±.43	1.43	2.3 ±.48
	Bill (measured from anterior border of nostril)					Bill (measured from anterior border of nostril)				
Yukon (*S.a. ochracea*)...........	11	6.9-7.8	7.28 ±.07	.23	3.1 ±.67	7	7.0-7.3	7.16 ±.05	.14	2.0 ±.52
Banks I. (*S.a. ochracea*).........	1	—	7.0	—	—	4	6.7-6.9	6.78 ±.04	.08	1.2 ±.44
Hudson B., James B., Ungava B., (*S.a. arborea*)................	19	7.0-7.7	7.35 ±.05	.23	3.2 ±.52	12	6.7-7.7	7.15 ±.06	.21	3.0 ±.61

Origin of specimens. *Yukon:* Lapie River, 3 ♂♂, 1 ♀; Sulphur Lake, 1 ♂; Kluane Lake, 5 ♂♂, 2 ♀♀; Rose River, 2 ♂♂, 3 ♀♀; Haines Road, 1 ♀. All taken between June 10 and July 25. *South Hudson Bay:* Little Cape, 4 ♂♂; Shagamu River, 1 ♂, 1 ♀. *James Bay:* Latitude 53° 45′, 1 ♂; Moose River, 2 ♀♀; Raft River, 2 ♂♂; George River, 5 ♂♂, 1 ♀; South Twin Island, 1 ♂; Point Huard, 1 ♂; North Point, 1 ♂, 4 ♀♀; Paul Bay, 1 ♀. *Ungava Bay:* Chimo, 1 ♂, 3 ♀♀; mouth of Koksoak River, 1 ♂; False River, 1 ♂. All specimens from the last three areas taken between June 1 and August 8. The six Banks Island specimens were taken between May 24 and June 5.

The difference in the numbers of specimens measured for wing, tail, and bill is due to the omission of those with excessive and unusual amount of feather wear. One Banks Island female had a broken bill.

the western race, but, contrary to Taverner and Sutton (1934), a Shoal Lake (April) and an Oak Lake (September) specimen seem closer to comparable Ontario migrants. Nevertheless, it appears not only that the Churchill birds must come from the southeast, as suggested by Taverner and Sutton (1934), but that, if Preble (1908), Harper (1953), and Manning (1948)[1] are correct in referring birds from the Great Bear and Great Slave lakes region, Nueltin Lake, and the territory between there and Hudson Bay to the eastern race, a good proportion of the breeding birds from the vicinity of the tree-line westward from Churchill to Great Bear Lake must also migrate to and from the southeast, possibly following the edge of the trees.

Comparison of wing, tail, and bill lengths is not helpful in identifying the Banks Island or other worn specimens from intervening areas, and as shown by the table, six western females have on the average slightly shorter tails than 11 eastern birds, possibly because they are more worn. A peculiarity of the Banks Island birds is their short bills. The difference, .38 mm., between the means of the four Banks Island females and the seven females from the Canol and Haines roads is statistically significant ($t = 4.5$, $P < .01$). Possibly the bills of birds forced to search for food north of their normal range in the comparatively barren, stony ground of Banks Island are subject to greater wear; or the difference may be seasonal (Cf. Davis, 1954), since they were taken at an average earlier date than the other samples.

The weights of two females from Sachs Harbour taken on May 24 and 30 were 19.5 gm. and 17.0 gm., respectively.

Zonotrichia leucophrys gambelii (Nuttall), Gambel's White-crowned Sparrow, *Akulurak Siudshuk*

It is unlikely that Gambel's Sparrow ever breeds on Banks Island, although casual wanderers may be fairly frequent, since Porsild (1943) says it is common in the Mackenzie Delta and breeds eastward from there north of the tree limit. A male was collected within the Sachs Harbour settlement on May 18, 1953, and another was seen with a Junco and a Tree Sparrow near there on May 30. Later the same day, this or a third White-crowned Sparrow was seen. The eastern race has been twice recorded from Baffin Island (Soper, 1946), but the above observations appear to constitute a northern record for the species, and to be the first for the western arctic islands.

The weight of a male taken May 18, 1953, was 25.7 gm.

Melospiza melodia juddi Bishop, Dakota Song Sparrow

A female Song Sparrow, clearly referable to this race, was taken at De Salis Bay on June 4, 1952. The previous northern record appears to be a specimen taken by Preble (1908) at Fort Rae on Great Slave Lake.

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[1] The eight worn specimens identified have not been re-examined. They were considered to agree better with the Churchill birds in the National Museum than with Yukon material. However, more recent specimens from James Bay indicate that the breeding Churchill specimens with which they were compared are not all typical of *S.a. arborea*.

Calcarius lapponicus lapponicus (Linnaeus), Lapland Longspur, *Nassauligaluk*

The Lapland Longspur is by far the commonest and most generally distributed bird on Banks Island. It is also a common bird on Prince Patrick Island (MacDonald, 1954) and on Melville Island (Hennessey, 1910), so a considerable number of migrants presumably pass over Banks Island. The total adult summer population is estimated to be 700,000.

Porsild (1951) noted Lapland Longspurs in most places he visited in 1949, and says they were the only common small land bird. Macpherson saw three in a three-quarter-hour walk at Wolley Point on August 26, 1951. In 1952, they were first recorded at De Salis Bay on May 29, when three were seen. Next day 115 were counted in 7½ hours, mostly in flocks of 25. Males outnumbered females on this date and on May 31, but by June 1 the sexes were about equally represented. By June 10 almost all those which had been scattered in pairs over the nearly barren ground of the low, rolling ridges and had apparently been occupying nesting territories since June 1, had moved to the marshes and better vegetated country. Prior to June 2, the largest ovum found in any female was 1.5 mm., but on June 5 a female was taken with a complete egg in its oviduct, and three or four females taken during the next three days had fully developed yolks. In 1953, the first Lapland Longspur, a male, was seen at Sachs Harbour on May 19. The first was heard at Cape Kellett on May 21. After this, their numbers increased slowly, but most of those seen up to May 26 were males. On May 29, Lapland Longspurs were exceedingly abundant on the snow-free ground at Mary Sachs and between there and Sachs Harbour. After that date they were seen every day in the Sachs Harbour region and became much more plentiful about Cape Kellett. The main migration was over by June 3, and they had settled down in pairs. At the Egg River a male was seen carrying nest material on June 2. In 1952, the first young were observed flying on July 7, and by July 25 about half those recorded in the table were juveniles. In 1953, flying young were first noted at Sachs Harbour on July 18, and the adult males had ceased to sing by July 4 of that year. Most of those seen after August 10 in both years were in flocks, and the majority probably left northern and eastern Banks Island at the beginning of September. On our sledge journey from the Thomsen River to Storkerson Bay between September 2 and 10, only 11 were seen in 80 hours, and none after the latter date. In 1951, two were seen at De Salis Bay on September 2 in about four hours walking.

The following nests were recorded: 1952: Masik Valley, June 18, 6 eggs; Sachs Harbour, June 23, 2 eggs, 4 young; in 1953: Cape Kellett, June 16, 6 eggs; June 17, 6 eggs; Sachs Harbour, June 17, 4 eggs, 5 eggs; June 18, 2 eggs; June 20, 5 eggs; June 28, 5 eggs; Lennie River valley, July 1, 5 eggs; Bernard River valley, July 9, 4 eggs, 5 eggs; July 10, 6 eggs, also nest within which young were hatching.

Danish authorities, with apparently good material for study, disagree on the subspecific status of the Greenland Lapland Longspur. Salomonsen (1950–2, p. 524) would separate it from the nominate Lapland race under the name *C.l. subcalcaratus* (Brehm) in view of its larger and more robust bill, the mean length, measured from the skull, of 57 Greenland males being 14.54 (13.4–15.4) mm. against 13.13 (12.1–14.2) mm. for 36 Scandinavian specimens. This allows a separation of 75 per cent of all specimens. In addition, he says there is a slight difference in colour, Greenland birds having "narrower and paler creamy-white edges to the feathers on the upper parts, with the mesial parts of the feathers darker, blackish". This difference is best seen in fresh moulted autumn plumage and in juvenile plumage. With the Greenland race he also places all the North American population, considering, perhaps because of the lack of fresh autumn specimens, *C.l. alascensis* a poorly marked race. Hørring (1937, 1939) could see no difference in the colour of the Greenland birds, and considered the difference in bill size insufficient for subspecific separation. If the three autumn males from Godthaab, Greenland, in the National Museum, are representative of that population, the Baffin Island birds have much paler dorsal feather edgings and are therefore in this character farther removed from the typical race and would therefore support a division. The bill measurements given in Table XLI, being taken from the anterior border of the nasal fossa, are not comparable with those of Salomonsen (1950–1) or Hørring (1937, 1939). The mean bill length of the Baffin Island males measured from the posterior border of the nostril is 9.93 mm., or. 83 mm., greater than that given by Hørring (1939) for Greenland birds. This difference is unlikely, especially as Hørring (1937) gives the mean for 10 eastern Canadian Arctic males as 9.06 mm. With this conflicting evidence it seems advisable to continue to refer eastern Canadian Lapland Longspurs to the nominate race, *C.l. lapponicus*, with the proviso that direct comparison of good series will probably justify their separation.

No topotypical *C.l. alascensis* from the Pribilof Islands have been seen, but five males and two females in good post-juvenal plumage taken on Herschel Island on August 18-19, 1951, are easily separated from the rather uniform autumn Baffin series by the narrower and less deeply black centres of the dorsal feathers and their wider, less Tawny more Buckthorn Brown but not markedly paler margins. These specimens are well matched by two males, taken August 4 and 6, and two females, taken on August 6, from Teller, Alaska, and one female from Unalaska Island, taken on August 8. It is therefore assumed that they are reasonably typical of *C.l. alascensis*. Our two males taken on the north coast of Banks Island on August 22 and the single female taken on August 16 are closer to the Baffin series than to the Herschel Island specimens, as also appear to be a male and female taken at Cape Kellett on September 5 and September 3 by the Canadian Arctic Expedition. It is on this evidence that the Banks Island population is tentatively referred to *C.l. lapponicus* in spite of some differences between the larger series of spring and breeding birds and comparable Baffin Island material; also, a male and two females in autumn plumage from Prince Patrick Island match the Baffin series still better, and therefore to some extent support the identification of the Banks Island population.

Specimens in spring and breeding plumage are less satisfactory for subspecific determination in this species, and sufficient specimens indisputably referable to *C.l. alascensis* are not available for useful comparison with our Banks Island collection. Compared with June Baffin Island birds, both the southern Banks Island and the Prince Patrick Island males have, on the average, distinctly more white edging to the feathers of the upper back and paler edging to those of the rump. In the collection of 25 Banks Island and 30 Baffin Island specimens, 58 per cent are separable. The females also have paler edges to some of the back feathers, and out of 19 Banks Island and 12 Baffin Island specimens, 64 per cent are separable.

As shown in Table XLI, the Banks Island series of both sexes average shorter in wing and bill than the spring and breeding Baffin Island birds. For the males, the difference in wing length, 1.92 mm., is significant ($t=3.1$, $P < .01$), although clearly not the difference in bill length, .07 mm. For the females, the differences, 1.39 mm. for wings, .35 mm. for bills, are both significant ($t=2.3$, $P < .05$, $t=3.1$, $P < .01$ respectively). The small difference between bill lengths of the Banks Island and Baffin Island males is noteworthy, particularly as Prince Patrick Island males also have large bills, whereas those of the south Hudson Bay and James Bay breeding sample, which match the Baffin birds in plumage, are significantly larger (2.9 mm.: $t=2.7$, $P < .01$) than those of the Baffin males. The difference, .14 mm., between the Baffin and the northwestern Hudson Bay samples is not significant ($t=1.1$, P about .3). The measurements given by Ridgway (1901) show that short wings and bills, presumably indicative of small size, are not a characteristic of *C.l. alascensis:* indeed, topotypes from the Pribilofs as well as specimens from the Aleutian Islands are decidedly large.

No autumn specimens are available from the central arctic coast or interior barrens, and a good series from these regions is most desirable. Three breeding females and two males from Baillie Island, three females and two males from the south side of Dolphin and Union Strait, all June and July birds, compare well with the Banks Island birds in colour of the feather edgings. In addition, the feathers of the back have narrower dark centres, and the mainland population may therefore be referred to *C.l. alascensis.* Two breeding females from Bathurst Inlet resemble the western specimens, but two worn males are closer to the Baffin Island birds. A good autumn migrant series from farther south also suggests that *C.l. alascensis* may come farther east on the mainland than it does on the islands. Amongst these autumn migrants there are also a number of birds of both sexes with dorsal feather edgings distinctly paler than any of the Herschel Island or Alaska birds mentioned, being matched only amongst specimens from the barren grounds by a female from the Hulahula River, Alaska. From British Columbia and Yukon and the extreme western Mackenzie District, four males and one female (from the Alaska Highway and the Canol Road) closely match the Herschel Island series, the remaining six males and three females being distinctly paler. In Alberta, the division is less sharp, and about half the 12 males and 15 females match the Herschel Island series, while the palest of the remainder are equal to the lightest from British Columbia. In the Saskatchewan series of 12 males and eight females, three males and two females from Indian Head and Regina agree best with the Baffin Island series, three males and three females match the Herschel Island birds; the remainder are definitely paler, two males and two females from Flotten Lake in the northwest of the province being as pale as any in the migrant series[1]. Half the Manitoba specimens (2 ♂♂ from Oak Lake, 2 ♂♂ and 2 ♀♀ from Cormorant Lake) are paler than the Herschel Island series, and only two (♂, ♀, from Shoal Lake) of the remaining seven (♂, ♀, from Shoal Lake; ♂ from Brandon; ♂, ♀, from Cormorant Lake) are typical of the Baffin series. A male taken on August 27 at

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[1] Godfrey (1950) also notes the occurrence of both races in Saskatchewan, but refers about half to *C.l. lapponicus.*

TABLE XLI

Measurements of *Calcarius lapponicus lapponicus* in Breeding and in Autumn Plumage

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
Herschel I. (autumn)	5	92-94	92.96	—	—	2	87-89	87.9	—	—
Banks I. (breeding)*	25	86-95	91.56±.41	2.06	2.3±.32	15	84-89	86.53±.33	1.26	1.5±.27
Prince Patrick I. (breeding)	6	89-93	91.53	—	—	4	85-88	86.78	—	—
Prince Patrick I. (autumn)	3	93-93	93.0	—	—	2	88-88	88.2	—	—
Baillie I., Dolphin and Union Strait (breeding)	2	93-93	93.3	—	—	5	86-87	86.68	—	—
Greenland (autumn)	3	94-97	95.8	—	—	—	—	—	—	—
Baffin I. (breeding)	27	88-98	93.48±.44	2.30	2.5±.34	13	85-91	87.92±.51	1.82	2.1±.41
Baffin I. (autumn)	17	88-97	93.76±.53	2.18	2.3±.40	11	85-91	87.27±.58	1.91	2.2±.47
N.W. Hudson B. (breeding)	10	90-95	93.00±.53	1.67	1.8±.40	8	83-88	85.82±.74	2.09	2.4±.61
S. Hudson B., James B. (breeding)	12	89-98	92.50±.73	2.53	2.7±.56	6	85-89	86.82	—	—
	Bill from anterior border of nasal fossa to tip					Bill from anterior border of nasal fossa to tip				
Herschel I. (autumn)	5	7.6-8.1	7.82	—	—	2	7.2-7.3	7.25	—	—
Banks I. (breeding)	25	7.7-8.8	8.33±.06	.27	3.3±.47	15	7.2-8.3	7.8±.08	.32	4.1±.74
Prince Patrick I. (breeding)	6	8.1-8.9	8.47	—	—	5	7.5-7.8	7.66	—	—
Prince Patrick I. (autumn)	5	7.2-8.5	7.66	—	—	2	6.7-7.0	6.8	—	—
Baillie I., Dolphin and Union Strait (breeding)	2	8.3-8.7	8.5	—	—	5	7.4-8.4	7.96	—	—
Greenland (autumn)	3	8.1-8.4	8.27	—	—	—	—	—	—	—
Baffin I. (breeding)	26	7.8-9.3	8.40±.07	.35	4.1±.57	14	7.7-8.6	8.15±.07	.26	3.2±.60
Baffin I. (autumn)	18	7.5-9.0	7.99±.11	.45	5.6±.94	11	6.8-8.2	7.58±.12	.40	5.3±1.13
N.W. Hudson B. (breeding)	10	7.7-8.7	8.26±.10	.31	3.8±.84	9	7.4-8.4	7.93±.10	.30	3.8±.90
S. Hudson B., James B. (breeding)	12	8.2-9.2	8.69±.09	.31	3.6±.73	6	7.8-8.5	8.07	—	—

Origin of specimens. *Herschel I.:* 5 ♂♂ (Aug. 19), 2 ♀♀ (Aug. 18). *Banks I.:* De Salis Bay, 19 ♂♂, 11 ♀♀; Cape Kellett, 4 ♂♂, 4 ♀♀; Sachs Harbour, 2 ♂♂ (♂♂, May 22–June 8; ♀♀, May 26–June 8). *Prince Patrick I.:* All from Mould Bay. (Breeding ♂♂, June 15–July 30. All June except one. ♀♀, June 18–Aug. 4. All June except one. Autumn ♂♂, Aug. 16-18; ♀♀, Aug. 16-21). *Baillie I.:* 3 ♀♀ (June 14–Aug. 5). *Dolphin and Union Str.:* Bernard Har., 2 ♂♂ (May 30–June 11), 2 ♀♀ (June 14–Aug. 5). *Greenland:* Godthaab, 3 ♂♂ (Aug. 25–Sept. 29). *Baffin I.:* (Breeding). Lake Nettilling, 18 ♂♂, 10 ♀♀; Camp Kungovik, 7 ♂♂, 2 ♀♀; Cape Dorset, 2 ♂♂, 1 ♀; Andrew Gordon Bay, 1 ♀ (Autumn). Airforce Island, 6 ♂♂, 3 ♀♀; Piling, 1 ♂; Rowley Island, 1 ♂; Pond Inlet, 2 ♂♂, 1 ♀; Blacklead Island, 2 ♂♂, 2 ♀♀; Prince Charles Island, 1 ♀; Ignirit, 2 ♀♀; North Arm, 3 ♂♂; Lat. 73° 00′, Long. 80° 37′, 3 ♂♂; Pangnirtung, 2 ♀♀. (Breeding ♂♂, June 1–July 10; ♀♀, June 2–Aug. 3. All June except 3. Autumn ♂♂, Aug. 10–Sept. 8; ♀♀, Aug. 15–Sept. 10). *Northwest Hudson B.:* Southampton Island, 4 ♂♂, 5 ♀♀; Cape Fullerton, 4 ♂♂, 4 ♀♀; Chesterfield, 2 ♂♂. (♂♂, May 20–July 25; ♀♀, June 13–July 28). *South Hudson B., James B.:* Little Cape, 1 ♂, 1 ♀; Cape Henrietta Maria, 5 ♂♂, 3 ♀♀; Moose River, 2 ♂♂, 1 ♀; North Point, 1 ♂, 2 ♀♀; South Twin Island, 2 ♂♂; Bear Island, 1 ♂; Long Island, 1 ♂. (♂♂, May 31–Aug. 5; ♀♀, May 30–Aug. 1).

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*I.e. in breeding plumage.

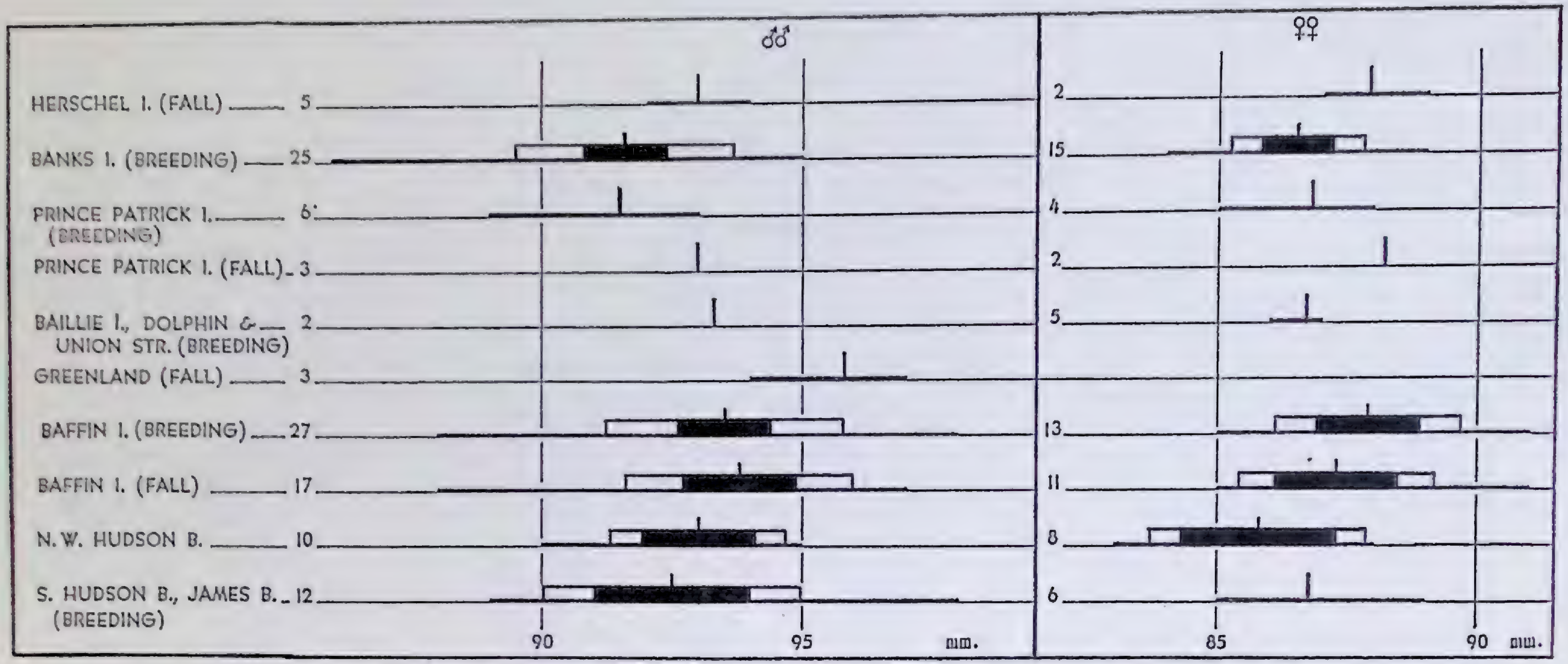

Figure 2. Wing chords of *C.l. lapponicus* and *C.l. alascensis* (*See* Table XLI for figures). The heavy base line indicates the range, the white rectangle the standard deviation, and the black rectangle twice the standard error of the mean.

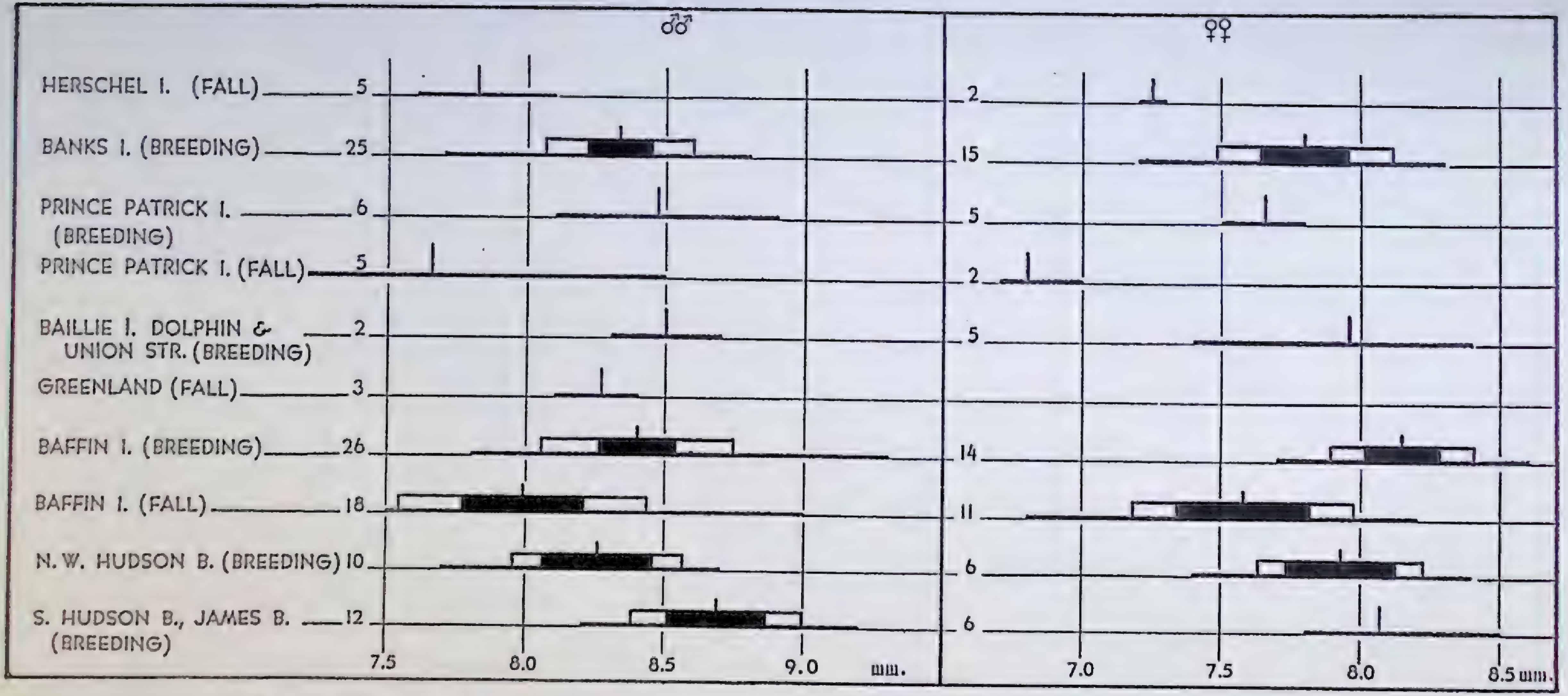

Figure 3. Bills of *C.l. lapponicus* and *C.l. alascensis* measured from the anterior border of the nasal fossa to the tip (*See* Table XLI for figures, and Figure 2 for explanation of rectangles).

Chesterfield is inseparable from the Baffin birds, and three August Churchill birds match them fairly closely.

Perhaps a large series from the arctic coast would show all the gradations from the present Herschel Island collection to the lightest migrants, but the breeding ground specimens so far examined from any one place, including those from Baffin Island, are quite constant and well matched; there is even a tendency for migrants taken about the same date and from the same place also to be similar. It seems probable, therefore, that the pale birds have a separate breeding territory, perhaps in the more inland barrens of the Mackenzie District and Alaska, the two populations being separated by the northward extension of the forest along the Mackenzie and the darker coastal birds of the delta.

No Alaska juvenals have been seen, but specimens from arctic Canada are extremely variable, being almost dichromatic. Some of the yellowest are from Dolphin and Union Strait. The three Banks Island and four Prince Patrick Island specimens are paler than the average, but can be matched by several Baffin Island and Southampton Island birds.

The weights of four specimens taken at Sachs Harbour were as follows: ♂♂, May 22, 30 gm.; May 30, 26 gm.; ♀, May 29, 27 gm.; juvenal ♂, July 16, 31 gm.

Plectrophenax nivalis nivalis (Linnaeus), Eastern Snow Bunting, *Amauligaluk*

The Snow Bunting is an abundant migrant in southwest Banks Island, but apparently less numerous in the southeast. Occasionally, males, which always arrive in the north several weeks ahead of the females (Cf. Soper, 1928, 1946), may reach Banks Island in early April, but their first appearance can be expected more regularly in the latter part of the month. Probably few, if any, remain on the island after the end of September.

Nesting Snow Buntings are abundant only in the northern part of the island in the region of Castel and Mercy bays and probably amongst the deep ravines east of there. Lesser numbers may be expected to nest along the coast to the west and in inland regions where there are cliffs or rocky outcrops. A few also breed in the gullies of the mud cliffs along the east coast and probably amongst the hills north of Nelson Head. An occasional pair may nest on the western side of the island[1], but they are certainly scarce there in the breeding season. Presumably a fair number of migrants pass across Banks Island to Prince Patrick and Melville islands, where they are a common nesting species (MacDonald, 1954; Hennessey, 1910), and some of the Snow Buntings seen on the north coast of Banks Island in the autumn may have been southward migrants. The total summer adult population is estimated to be 30,000.

Armstrong (1857, p. 213) saw a few Snow Buntings on September 7, 1850, near Nelson Head; in 1851 they were first seen near the *Investigator* at the Princess Royal Islands on April 27; and in the following year at Mercy Bay on April 20 (Armstrong, 1857, pp. 314, 513). In 1852, Collinson (1889, p. 190) noted them in Prince of Wales Strait between Ramsay Island and the Princess Royal Islands on April 24. Larsen (1945, p. 73) recorded two at De Salis Bay on April 19, 1941. Porsild (1951, oral communication) saw none on Banks Island until he reached a rocky area, 40 miles south of Mercy Bay.

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[1] Stefansson (1921, p. 227) mentions Snow Buntings on Norway Island at the end of June

In 1952, several flocks were seen at Cambridge Bay, Victoria Island, on May 9, and some had doubtless reached Banks Island before that date. At De Salis Bay, one was heard on May 13, tracks were seen on May 15, and the first bird was observed on May 16. A female and three juveniles were seen on July 14 near Milne Point, and evidently a few nest in the bouldery gullies of the mud cliffs in that region. In 1953, a few Snow Buntings had been seen at Sachs Harbour before we arrived on May 10. At Cape Kellett, a small flock of between 10 and 25 could usually be seen between May 14 and 28 on a patch of snow-free ground near the tent, and other flocks fed in similar areas, particularly along the cliff top to the eastward. No females were seen at Cape Kellett until May 21, and they were also scarce at Sachs Harbour until about that date, but by May 25 they were as numerous as the males. The maximum migration at Sachs Harbour was on May 21, and at Cape Kellett between May 23 and 26. No migrants were seen at Cape Kellett after May 28, or at Sachs Harbour after June 4, but a pair was noted on June 1, and on June 13 the same or another pair was seen gathering nesting material. A male was seen alone on June 19.

The variation, both individual and geographical, in the colour of Snow Buntings, particularly in the amount of white on the wing and tail feathers, has been discussed by Salomonsen (1931). The most marked variation, at least in Canadian birds, is shown by the primary coverts of the males, which grade from pure white through the least fleck of dark to entirely dark feathers. This gradation cannot be measured conveniently because the shape of the dark area is not regular, but there appears to be a slight gap between the specimens with dark only on the tips of the feathers and those with a more or less continuous patch 15 mm. in length. This facilitated their division into the four groups shown in Table XLII. The darkest (group D) presumably correspond with the 'retarded males' described by Salomonsen (1950–1, p. 535), although they do not appear to be sharply differentiated from the third group. It is probable that they are mostly first year birds, but, as Salomonsen pointed out, first year males may also have no more than a dark tip to the primary coverts. No juvenal or first year (as indicated by the skulls) birds with immaculate primary coverts have been found in the National Museum collection. Birds with white, or only black-tipped primary coverts, usually have a greater extent of white on the secondaries and at the base of the primaries (Cf. Salomonsen, 1931). Specimens with immaculate or merely black-tipped primary coverts from both Baffin (breeding plumage) and Banks islands have on the average longer wings than birds with darker coverts from these areas, perhaps because of the greater average age of the former. The differences, 3.26 mm. and 3.56 mm. respectively, are significant: $t=3.4$, $P < .01$, and $t=3.1$, $P < .01$. A similar relationship between size and colour may be expected in other populations.

Salomonsen (1950–1, p. 539) gives the percentage of Snow Buntings with pure white primary coverts as 50 per cent in northeast Greenland and in other areas [of Greenland?] occupied by *P.n. nivalis* as 26 to 28 per cent. Table XLII shows that there is also a high percentage of the white-winged

TABLE XLII

Variation in the Amount of Dark on the Primary Coverts of *Plectrophenax nivalis nivalis* taken within the Canadian Breeding Range

		A Immaculate	B Black-tipped	A and B Total	C Largely dark	D All or nearly all dark	C and D Total	A, B, C, D Total examined
Western Queen Elizabeth I.—	breeding plumage	8	2	10	6	—	6	16
	autumn "	8	—	8	—	1	1	9
Ellesmere I.—	breeding plumage	4	2	6	2	1	3	9
	autumn "	—	—	—	—	—	1	1
Baffin I.—	breeding plumage	9	6	15	15	8	23	38
	autumn "	2	3	5	7	8	15	20
Ungava B.—	breeding plumage	—	3	3	1	—	1	4
N.W. Hudson B.—	breeding plumage	5	2	7	4	2	6	13
Dolphin and Union Str.—	breeding plumage	3	1	4	3	—	3	7
Banks I.—	breeding plumage	5	2	7	9	3	12	19
Tuktoyaktuk—	autumn plumage	4	2	6	4	8	12	18

form in the northern part of the Canadian breeding range, amounting to 57±8 per cent in the Queen Elizabeth Islands against 23±4 per cent south of there. One cannot help wondering, therefore, if this may not be caused by a tendency for the older birds to go farther north, particularly as Salomonsen (1950–1, p. 535) gives reason to suspect that they are the first to migrate north in the spring.

No autumn specimens were taken on Banks Island, but specimens from other regions, particularly the males, show considerable individual variation in the shade of feather borders. This is further complicated by wear (and surely also by fading or by some chemical change in the feather pigments) which seems to occur chiefly between early and late September.

The borders of the dorsal feathering of Prince Patrick Island birds may average slightly paler than comparable Baffin Island specimens, but not when they are compared only with those Baffin birds which have white primary coverts. There are too few late autumn specimens from the eastern arctic for satisfactory comparison with the Tuktoyaktuk series, but the latter can be matched by more southern, eastern migrants taken at about the same date.

Tables XLIII and XLIV give respectively the wing chords and bill lengths for all suitable material in the National Museum taken within the breeding range of the species. The mean wing length of the Banks Island males is 2.43 mm. shorter than that of the Baffin Island males in breeding plumage, and the wing length of the females, 2.61 mm. shorter. Both differences are significant: $t=2.8$, $P < .01$, and $t=4.3$, $P < .01$, in spite of some of the later June and July Baffin Island specimens being slightly more worn. The table further indicates that the average size of breeding birds across the mainland (including Southampton Island and the southern part of Victoria Island) from Ungava Bay westward, probably at least to the Alaska border, is comparatively small, perhaps reaching a minimum in the interior about the Back River. The discrepancies can be explained by the smallness of the collections from some of the areas, and in the case of the northwestern Hudson Bay females, which have a large coefficient of variation, by migrants inevitably included in a spring series. The 12 specimens obtained by the Fifth Thule Expedition from northwest Hudson Bay and the Northwest Territories (Hørring, 1937) also average small. If an allowance of 2 mm. is made for the increased length of the flattened wings (the measurement presumably taken by Danish authors), it appears that the wing length of the Banks Island and Canadian mainland birds agrees fairly well with the means given by Salomonsen (1931) for breeding Lapland birds (23 males = 108.22 mm.; 15 females = 102.27 mm.) and west Greenland specimens (73 males = 109.69 mm., 25 females = 101.88 mm.). The Baffin specimens average larger and approach the northeast Greenland birds (112.85 mm. for 54 males, and 105.69 mm. for 19 females (Salomonsen, 1931)).

Bill length in general follows wing length—the mainland, Southampton and Banks islands being populated by comparatively short-billed birds, although the small Dolphin and Union Strait collection averages longer. The material available suggests that the wing length of Prince Patrick Island birds is intermediate between those of Baffin and Banks islands, although the means are not significantly different from either.

The Tuktoyaktuk series, which was taken from some of the last birds remaining around the buildings, agrees very well in wing and bill length with Prince Patrick Island autumn specimens, and it is possible that they had come from that region, but since Tuktoyaktuk is well to the west of the direct southward route, and Snow Buntings are known to nest on the islands off the Mackenzie Delta (Porsild, 1943), it is more probable that they had bred locally.

Autumn specimens are less satisfactory for quantitative comparison since movement probably commences as soon as the post-nuptial and post-juvenal moults are complete, and the inclusion of a few specimens with incomplete primary growth may seriously affect the results. In the autumn, slightly smaller average wing lengths may be expected, at least amongst the males, owing to the greater proportion of the smaller, dark-winged form, the retarded males of Salomonsen (1950–1). The small wing length of the Baffin Island autumn male series may also be due to the inclusion of the northeast Foxe Basin birds since, when these are omitted, the mean wing length of the remaining nine is 108.2 mm. The small average bill length of the Baffin Island autumn males cannot be entirely explained by the possible smaller size of sub-adult bills, since the mean of five adult and two October Baffin Island males is slightly smaller than that of the whole series. It suggests the inclusion of some Ellesmere Island migrants.

The weights of four specimens from Sachs Harbour were: ♂♂, May 16, 46 gm.; May 17, 41 gm.; May 23, 44.5 gm.; ♀, May 29, 44.5 gm.

TABLE XLIII

Measurements of *Plectrophenax nivalis nivalis* in Breeding Plumage

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
S.W. Banks I.	19	101-114	106.90 ± .63	2.75	2.6 ± .42	14	97-101	99.7 ± .42	1.55	1.6 ± .29
Dolphin and Union Str.	6	102-108	104.45	—	—	2	100-102	100.7	—	—
W. Queen Elizabeth Is.	16	104-110	107.31 ± .44	1.76	1.6 ± .29	5	99-101	100.64	—	—
Ellesmere I.	9	104-112	108.22 ± .77	2.30	2.1 ± .50	2	100-104	101.9	—	—
Greenland	2	105-105	105.2	—	—	2	99-102	101.6	—	—
Baffin I.	35	104-114	109.33 ± .53	3.14	2.9 ± .34	27	99-107	102.31 ± .36	1.89	1.8 ± .25
Ungava Bay	4	101-108	105.42	—	—	1	—	98.0	—	—
N.W. Hudson B.	12	103-109	105.83 ± .54	1.86	1.8 ± .36	13	98-107	100.93 ± 1.37	4.95	4.9 ± .96
	Bill measured from anterior border of nasal fossa to tip					Bill measured from anterior border of nasal fossa to tip				
S.W. Banks I.	19	7.5-8.6	8.08 ± .06	.24	3.0 ± .49	14	7.1-7.8	7.48 ± .06	.22	3.0 ± .57
Dolphin and Union Str.	5	7.7-8.7	8.32	—	—	2	7.6-8.0	7.80	—	—
W. Queen Elizabeth Is.	15	7.7-8.6	8.15 ± .07	.28	3.4 ± .62	5	7.4-8.1	7.62	—	—
Ellesmere I.	9	7.3-8.5	7.84 ± .12	.37	4.7 ± 1.12	2	7.4-7.7	7.55	—	—
Greenland	2	8.5-8.6	8.55	—	—	2	8.0-9.3	8.65	—	—
Baffin I.	35	7.2-9.1	8.19 ± .05	.32	3.9 ± .47	27	7.3-8.5	7.93 ± .05	.28	3.6 ± .49
Ungava Bay	4	7.8-8.7	8.12	—	—	1	—	8.0	—	—
N.W. Hudson B.	13	7.3-8.2	7.71 ± .08	.28	3.6 ± .70	13	7.1-8.4	7.71 ± .10	.36	4.7 ± .92

Origin of specimens. *Banks Island:* Cape Kellett, 16 ♂♂, 13 ♀♀; Sachs Harbour, 3 ♂♂, 1 ♀ (May 15-27). *Dolphin and Union Strait:* Bernard Harbour, 3 ♂♂, 1 ♀; Chantry Island, 1 ♂, 1 ♀; Richardson Bay (Victoria Island), 2 ♂♂ (June 19–Aug. 2). *Western Queen Elizabeth Islands:* Winter Harbour (Melville Island), 2 ♂♂, 1 ♀; Resolute (Cornwallis Island), 2 ♂♂; Mould Bay (Prince Patrick Island), 12 ♂♂, 4 ♀♀ (April 14–July 21; one undated). *Ellesmere Island:* Slidre Fjord, 5 ♂♂, 2 ♀♀; Ravine Bay, 1 ♂; Cape Sheridan, 2 ♂♂; Eureka Sound, 1 ♂ (May 5–June 5). *Greenland:* Godthaab, 2 ♂♂, 2 ♀♀ (July 30; one undated). *Baffin Island:* Lake Nettilling, 25 ♂♂, 19 ♀♀; Camp Kungovik, 5 ♂♂, 3 ♀♀; Lake Harbour, 4 ♂♂, 3 ♀♀; Cape Dorset, 2 ♂♂, 1 ♀; Pond Inlet, 1 ♂; Kingua Fjord, 1 ♀ (May 20–June 30). *Ungava Bay:* Chimo, 3 ♂♂; Leaf Bay, 1 ♂; Inuksuktuak Point, 1 ♀ (April 12–July 8). *Northwest Hudson Bay:* Cape Fullerton, 11 ♂♂, 5 ♀♀; Southampton Island, 1 ♂, 2 ♀♀; Hudson Bay (taken by Capt. G. Comer presumably at the northwest of the bay), 1 ♂, 6 ♀♀ (April 20–August 3).

TABLE XLIV

Measurements of *Plectrophenax nivalis nivalis* in Autumn Plumage

	♂♂					♀♀				
	No.	Extremes	Mean	σ	C.V.	No.	Extremes	Mean	σ	C.V.
	Wing chord					Wing chord				
Herschel I.	—	—	—	—	—	1	—	102.3	—	—
Tuktoyaktuk	18	101-112	107.11±.55	2.31	2.2±.36	6	97-103	99.83	—	—
W. Queen Elizabeth I.	4	103-111	106.5	—	—	6	101-104	102.45	—	—
Ellesmere I.	1	—	105.5	—	—	3	100-105	102.1	—	—
Greenland	4	109-113	110.6	—	—	1	—	103.6	—	—
Baffin I.	19	104-110	107.58±.38	1.66	1.5±.25	22	99-106	102.91±.39	1.82	1.8±.27
	Bill measured from anterior border of nasal fossa to tip					Bill measured from anterior border of nasal fossa to tip				
Herschel I.	—	—	—	—	—	1	—	7.3	—	—
Tuktoyaktuk	18	7.5-8.4	7.93±.05	.22	2.7±.45	6	7.6-8.2	7.80	—	—
W. Queen Elizabeth I. (Prince Patrick only)	9	7.6-8.5	7.99±.09	.26	3.3±.78	8	7.1-7.9	7.65±.10	.28	3.6±.91
Ellesmere I.	1	—	7.50	—	—	3	7.2-7.5	7.37	—	—
Greenland	2	7.9-8.1	8.00	—	—	1	—	7.7	—	—
Baffin I.	20	7.2-8.4	7.81±.07	.32	4.1±.66	25	7.0-8.1	7.59±.06	.30	4.0±.56

Origin of specimens. *Herschel Island:* 1 ♀ (Aug. 19). *Tuktoyaktuk:* 18 ♂♂, 6 ♀♀ (Oct. 3–9). *Western Queen Elizabeth Islands:* Mould Bay (Prince Patrick Island), 9 ♂♂, 8 ♀♀ (Aug. 11–29). *Ellesmere Island:* Slidre Fjord, 1 ♂, 3 ♀♀ (Aug. 28). *Greenland:* Godthaab, 4 ♂♂, 3 ♀♀ (July 30–Sept. 16; one undated). *Baffin Island:* Pangnirtung, 4 ♂♂, 3 ♀♀; Cape Dorset, 1 ♂, 2 ♀♀; Blacklead Island, 1 ♂, 3 ♀♀; Pond Inlet, 1 ♂; Kekerten Island, 2 ♀♀; Strathcona Sound, 1 ♀; North Arm, 2 ♂♂, 2 ♀♀; Ignirit, 7 ♂♂, 5 ♀♀; Spicer Islands, 1 ♂; Airforce Island, 3 ♂♂, 7 ♀♀ (Aug. 9–Oct. 15).

Except for two Greenland males in partial post-juvenal plumage and one Greenland juvenal, all the above specimens are adults in post-nuptial plumage or young birds which have completed their post-juvenal moult. The wing measurements of birds with obviously growing primaries have been excluded.

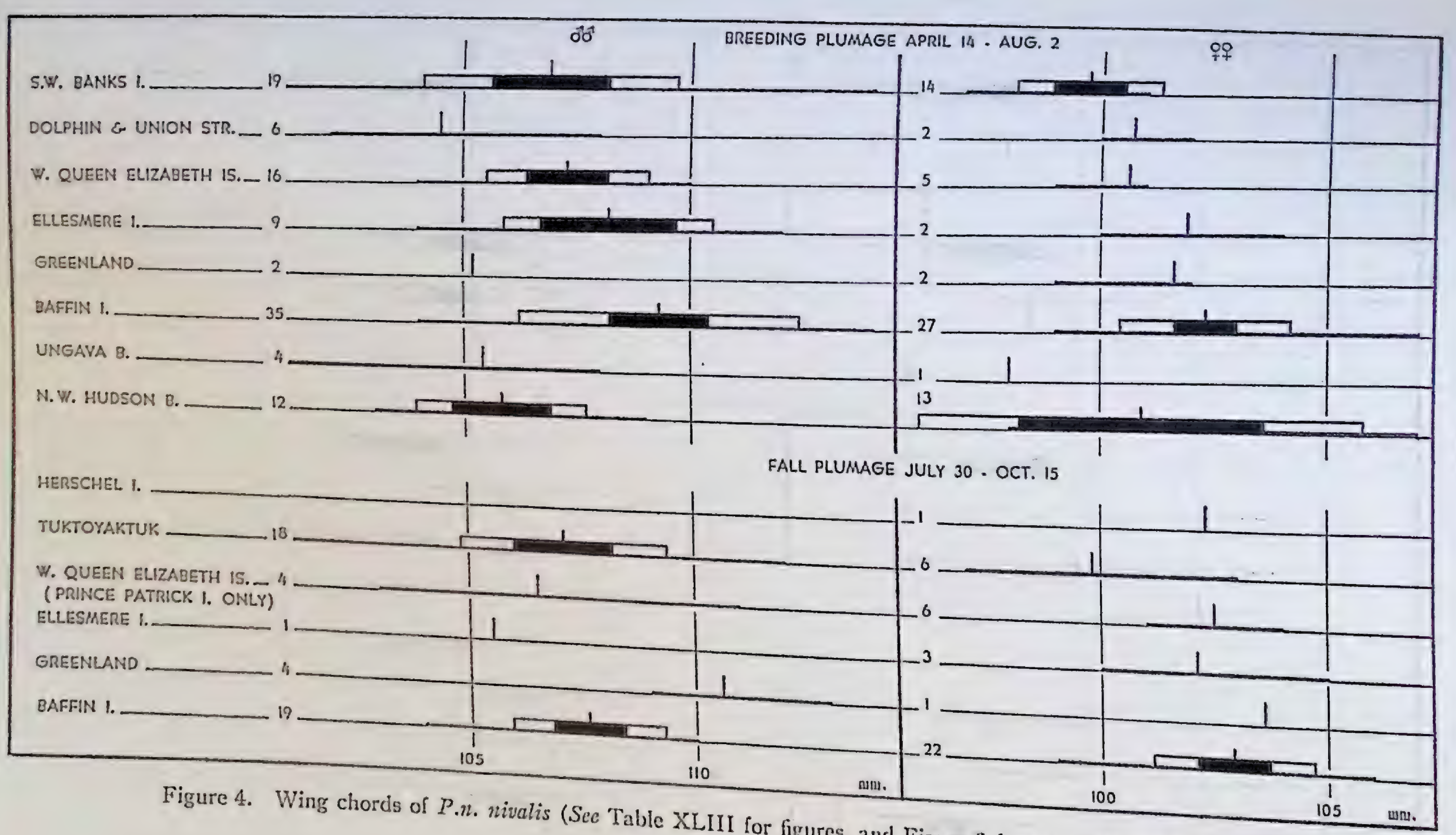

Figure 4. Wing chords of *P.n. nivalis* (*See* Table XLIII for figures, and Figure 2 for explanation of rectangles).

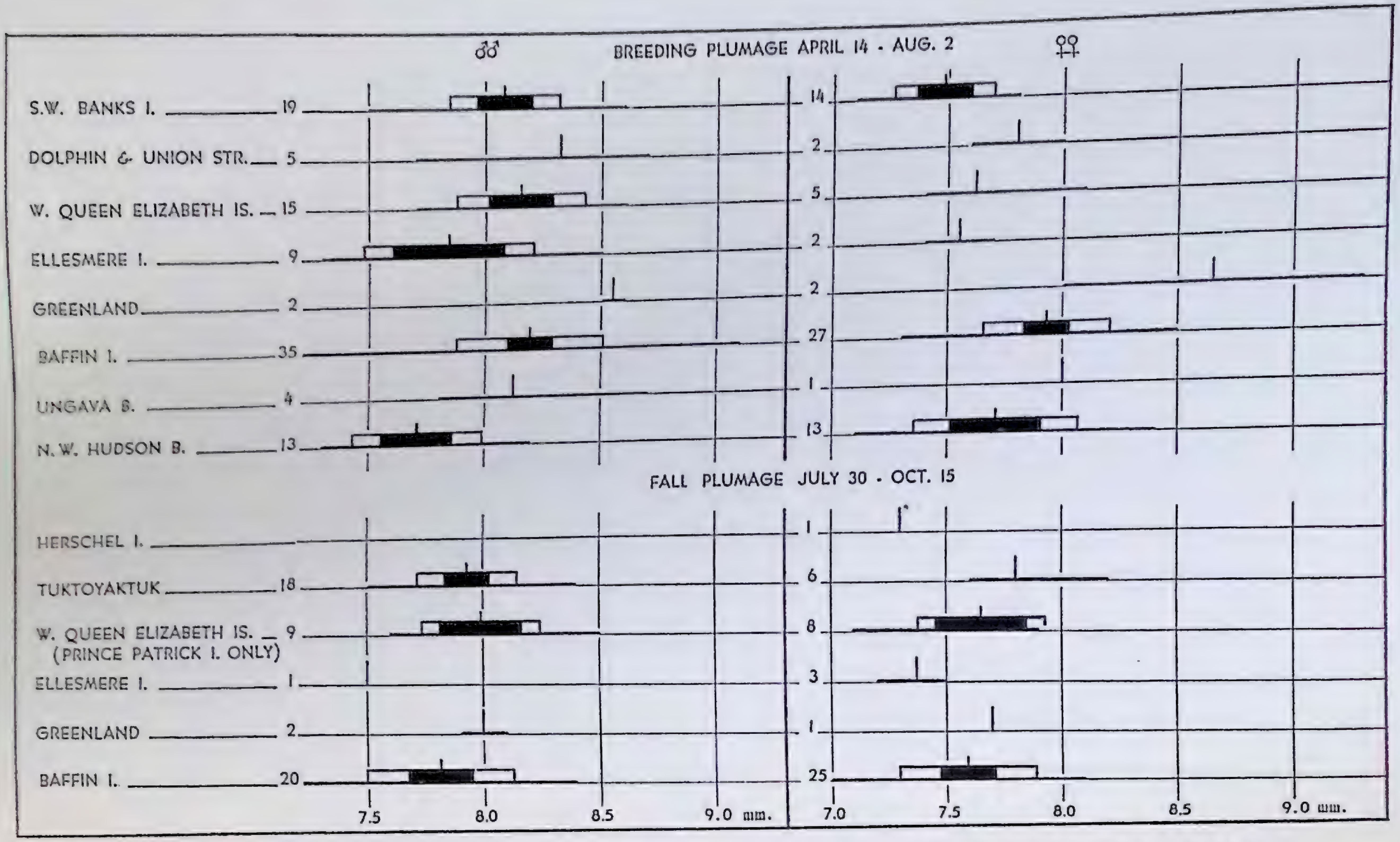

Figure 5. Bills of *P.n. nivalis* measured from the anterior border of the nasal fossa to the tip (*See* Table XLIV and Figure 2 for explanation).

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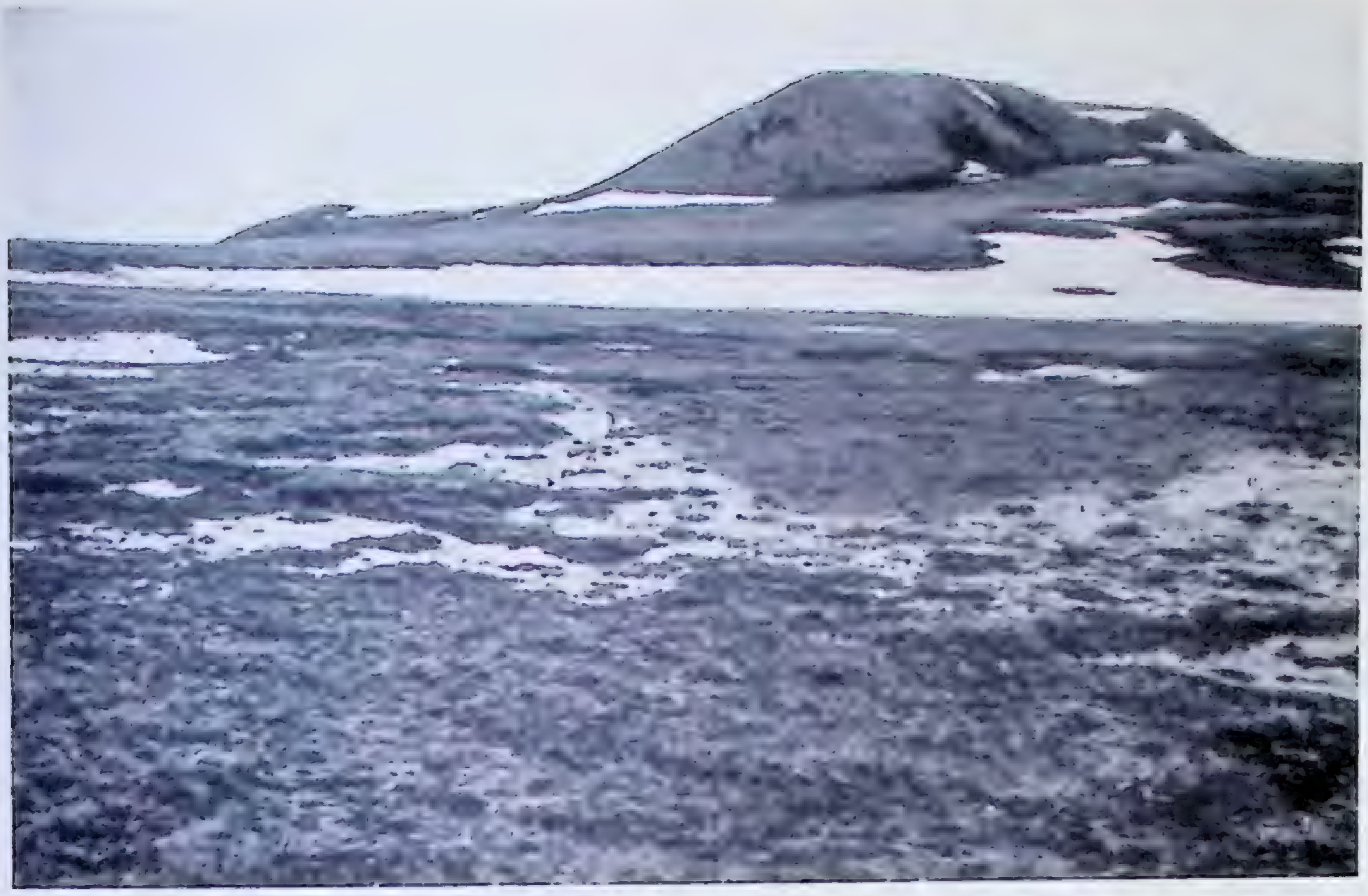
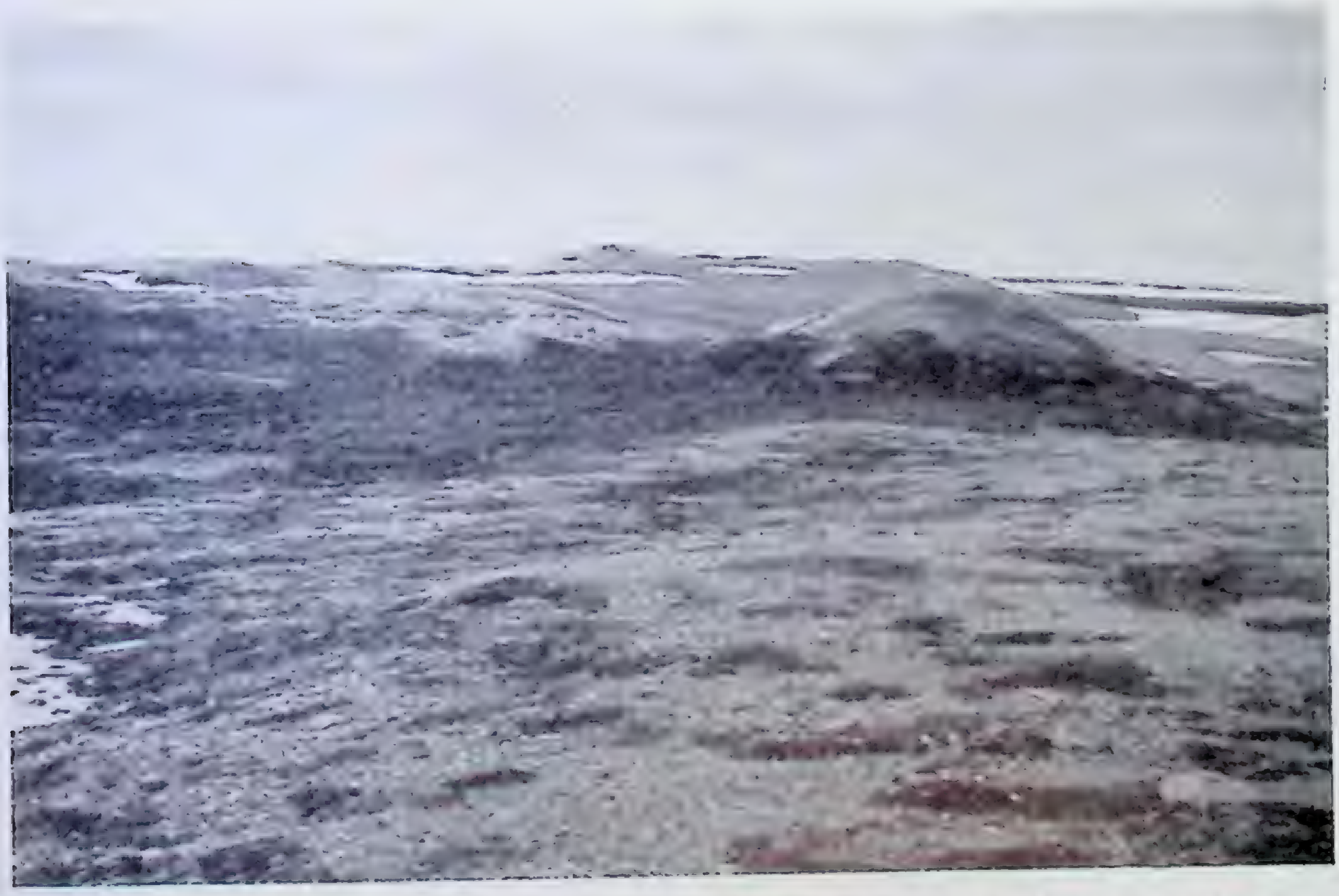


A. June 7, 1952. A grassy valley during the spring thaw. About 4 miles northeast of the main spring camp at De Salis Bay.



B. June 10, 1952. Looking eastward along the border of the hills about 5 miles north-northeast of the De Salis Bay main spring camp. In the foreground and elsewhere near the hill slopes the ground was dry, gravelly, and stoney, but farther inland surface growth covered deep, sticky, brown mud.

A. June 24, 1952. About 7 miles west of Raddi Lake. Looking west over peaty country in the Sachs River valley to the gravel hills that border the coast.

B. June 16, 1953. About 3 miles inland. Looking east along the south side of the ridge north of Kellett River valley. Most of the snow had gone from this sheltered slope, but in the distance the main part of the valley was still half snow-covered.

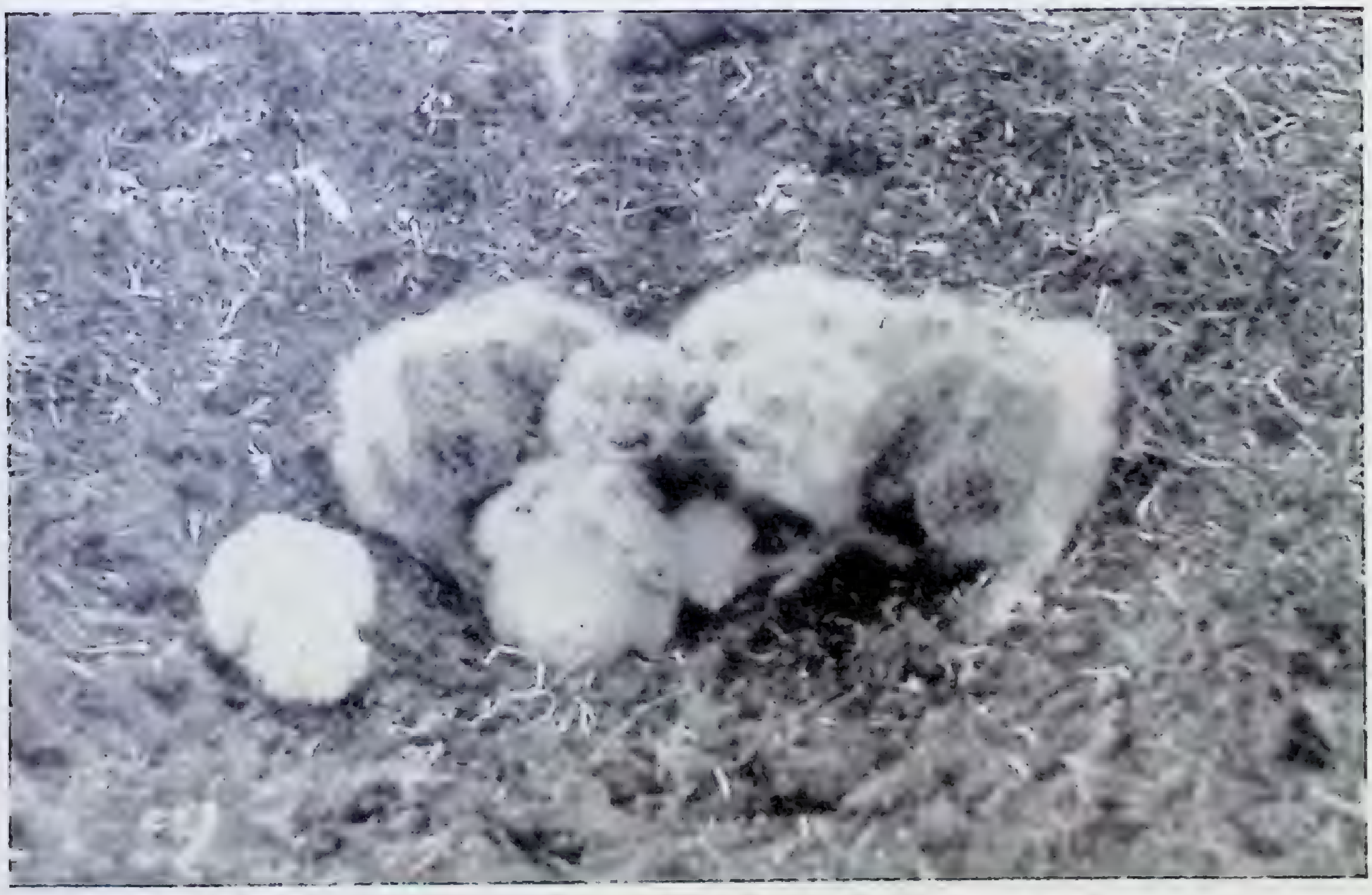
A. Aug. 15, 1952. Looking west over Antler Cove.

B. Aug. 27, 1953. Looking up Pim Ravine. The ground is covered by a few inches of snow, and only a little water was running in the stream bed shown in the foreground. The highest hill visible is about 800 feet.

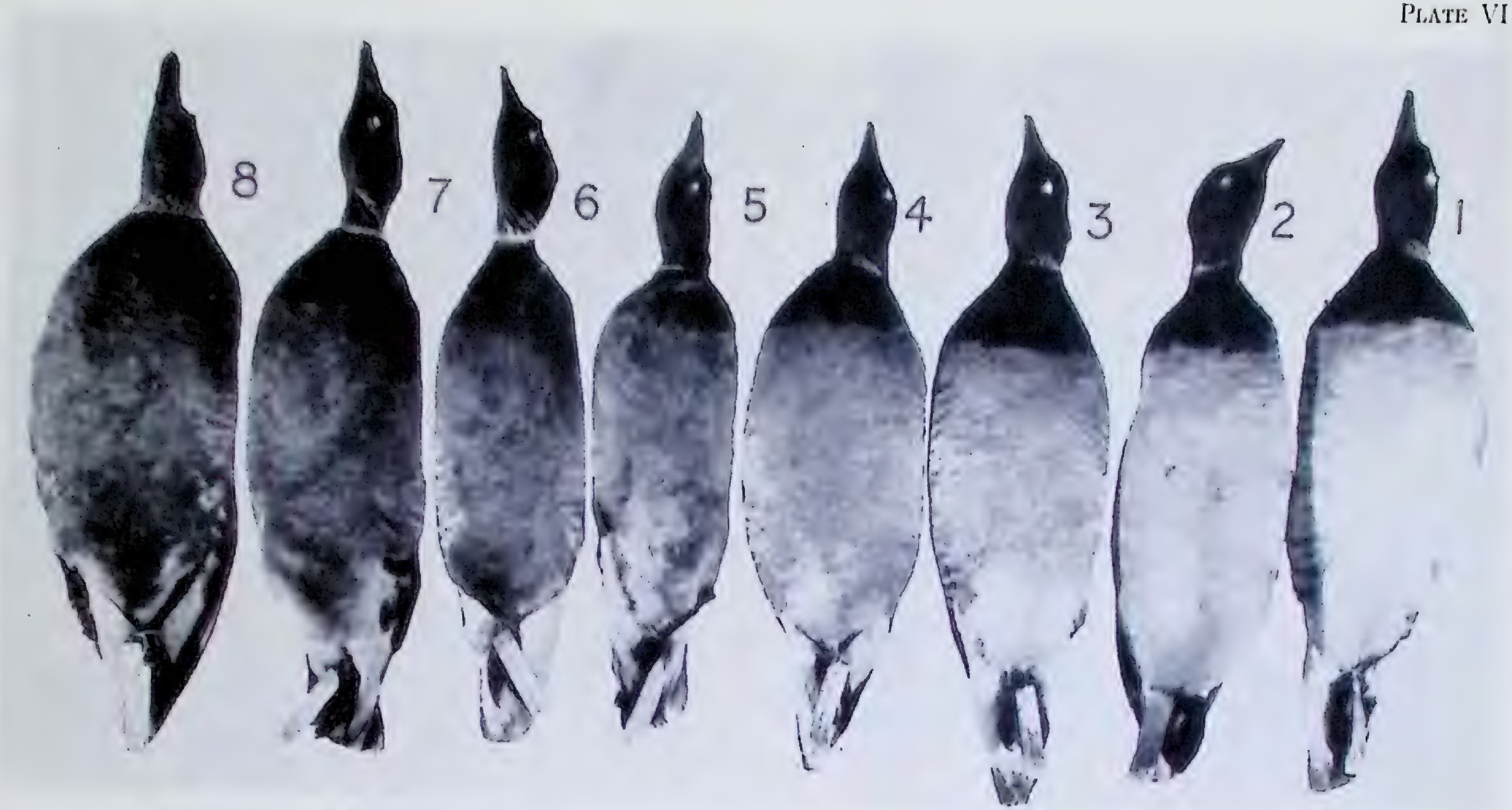
A. Aug. 11, 1953. Gyrfalcon Bluff from the north. The cliff face was estimated to be about 300 feet high.

B. June 21, 1952. A well camouflaged Little Brown Crane, *G.c. canadensis*, on its nest on the north side of Sachs River.

A. July 10, 1953. A Baird's Sandpiper, *E. bairdii*, on its nest just north of the Bernard River.

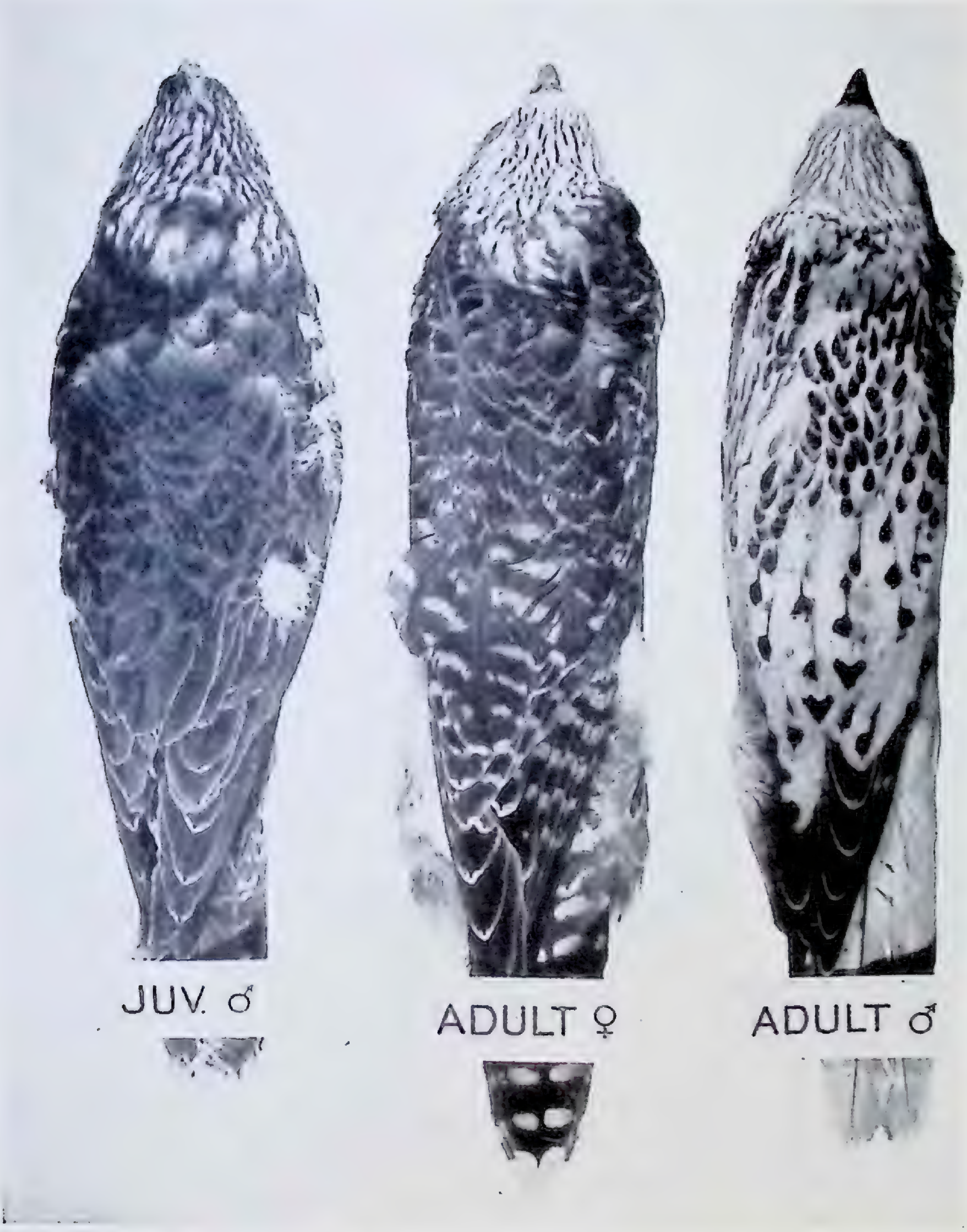


B. July 17, 1953. A nest with five young Snowy Owls, *N. scandiaca*, about 15 miles inland from the head of Castel Bay. Note the variation in size.

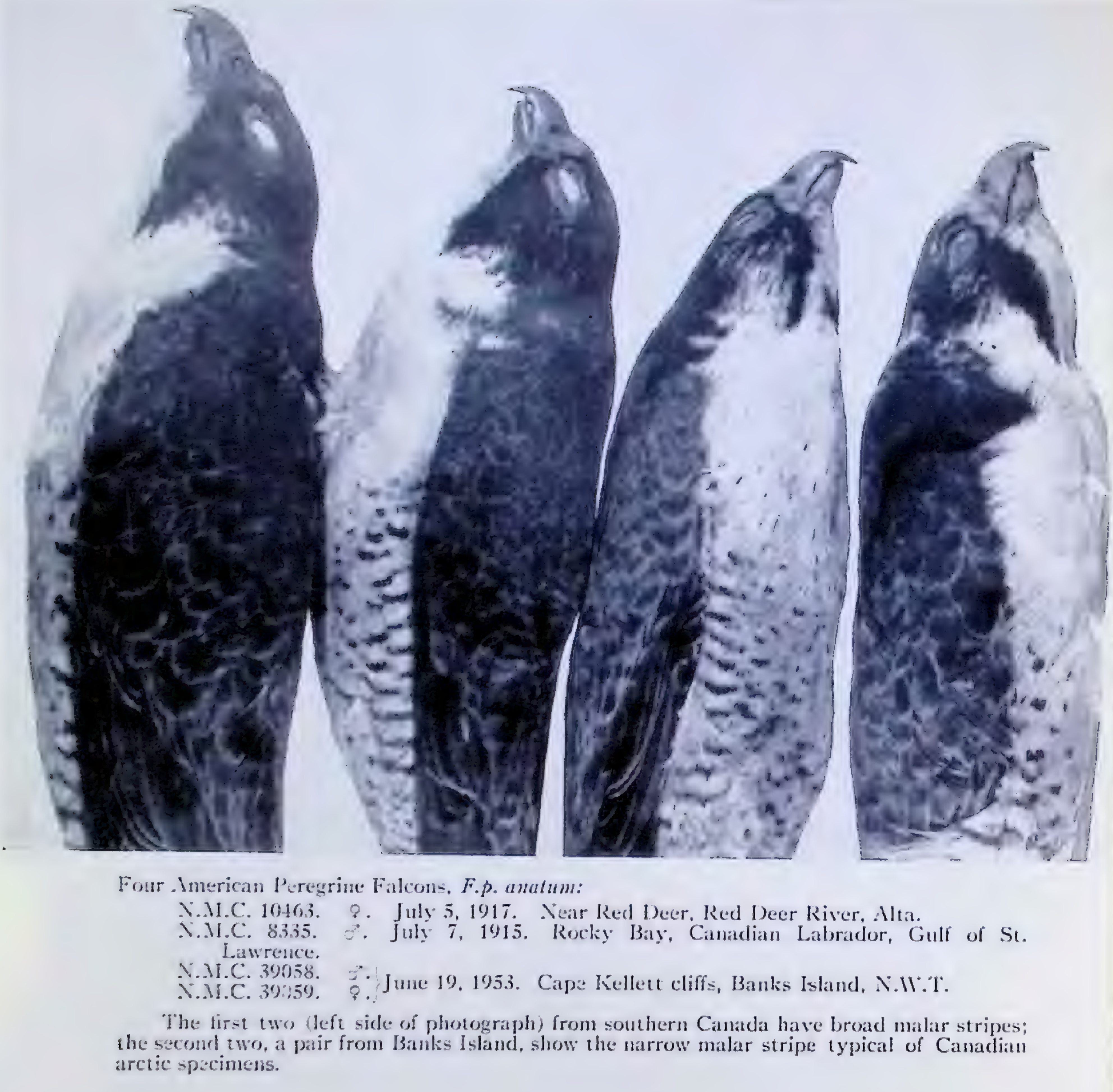


Eight Brant, *B.b. hrota* and *B.b. bernicla*, graded according to the colour of the lower breast:

Grade 1.	N.M.C. 35300.	Ad. ♂.	June 27, 1949.	Mould Bay, Prince Patrick Island, N.W.T.
Grade 2.	N.M.C. 7420.	Ad. ♂.	June 11, 1914.	Miscou Island, New Brunswick.
Grade 3.	N.M.C. 35303.	Ad. ♂.	June 27, 1949.	Mould Bay, Prince Patrick Island, N.W.T.
Grade 4.	N.M.C. 35291.	Ad. ♀.	June 18, 1949.	Mould Bay, Prince Patrick Island, N.W.T.
Grade 5.	N.M.C. 35270.	Yearling ♂.	July 4, 1949.	Mould Bay, Prince Patrick Island, N.W.T.
Grade 6.	N.M.C. 35298.	Ad. ♀.	June 18, 1949.	Mould Bay, Prince Patrick Island, N.W.T.
Grade 7.	N.M.C. 35299.	Ad. ♂.	June 27, 1949.	Mould Bay, Prince Patrick Island, N.W.T.
Grade 8.	N.M.C. 39462.	Ad. ♂.	June 6, 1953.	Cape Kellett, Banks Island, N.W.T.



Three American Gyrfalcons, *F.r. obsoletus*, taken from Gyrfalcon Bluff, the left-hand specimen, N.M.C. 35122, by A. E. Porsild on Aug. 24, 1949, and the other two. ♀, N.M.C. 39061; ♂, N.M.C. 39060, by T. H. Manning on Aug. 11, 1953.



Four American Peregrine Falcons, *F.p. anatum:*

N.M.C. 10463. ♀. July 5, 1917. Near Red Deer, Red Deer River, Alta.
N.M.C. 8335. ♂. July 7, 1915. Rocky Bay, Canadian Labrador, Gulf of St. Lawrence.
N.M.C. 39058. ♂.
N.M.C. 39059. ♀. } June 19, 1953. Cape Kellett cliffs, Banks Island, N.W.T.

The first two (left side of photograph) from southern Canada have broad malar stripes; the second two, a pair from Banks Island, show the narrow malar stripe typical of Canadian arctic specimens.

EDMOND CLOUTIER, C.M.G., O.A., D.S.P.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1956

Place	Date	Hours	Yellow-billed Loon	Pacific Loon	Red-throated Loon	Brant	Old-squaw	King Eider	Rough-legged Hawk	Peregrine Falcon	
Between C. Cardwell and Schuyter Pt.	July 13-14, 1952	24	—	—	—	—	70 (on sea)	20 (1.4)+20 on sea	—	2 (.08)	1 ♂, 1
N.E. side of De Salis B.	May 10-15, 1952, May 18-21, 1952	46½	—	—	—	—	—	—	6 (.17)	—	25 (1.6)
N.E. side of De Salis B.	May 27–June 16, 1952	143	2 (.03)	2 (.17)	1 (.10)	5 (.06) 1 ♀	78 (2.4) 2 ♂♂, 1 ♀	See text (13.) 9 ♂♂, 4 ♀♀	10 (.07)	1 (.01)	14 (.40)
N.E. side of De Salis B.	June 29–July 3, 1952	17	—	8 (.47)	9 (.66) 1 ♀	6 (.35)	69 (8.1)	55 (4.7)	—	2 (.12)	1 ♂ (.3
W. side of De Salis B.	May 16, 17, 23, 1952	15	—	—	—	—	—	—	4 (.26) 1 ♂	—	8 (1.6)
W. side of De Salis B.	June 16, 17, 1952	6	—	—	—	10 (1.7)	—	—	—	—	
W. side of De Salis B.	July 6-9, 17, 1952	21	6 (.29)	12 (.57) 1 ♀	6 (.36) 2 ♂♂	88[4]+4 downy 4 ♂♂, 3 ♀♀, 4 downy	41 (3.9)	60 (4.3) 16 downies 3 ♀♀+10 downy	—	—	
C. Collinson region	May 24, 1952	3	—	—	—	—	—	—	3 (1.0)	—	3 (3.0)
C. Collinson region	June 28-29, 1952	6	—	—	—	—	2 (.67)	—	—	—	
C. Collinson region	July 20, 1952	5	—	—	—	—	30 (on sea)	—	—	—	
Nelson River valley	July 21-25, 1952	17½	8 (.46)	5 (.29)	1 (.07)	—	32 (mostly on sea)	22 (on sea)	1 (.06)	—	
Masik River valley	June 17-19, 26, 1952	22	—	—	—	140 (6.4)	1 pr. (.18)	150 (10.)[5]	—	3 (.14) 1 ♂, 1 ♀	
Uplands S. of Masik R.	June 27-28, 1952	15	2 (.13)	—	—	—	—	31 (3.1)	—	—	
Between Masik R. and Raddi L.	June 19, 24-26, 1952	10	—	—	—	—	—	18 (2.7)	—	—	
Between Raddi L. and Sachs Har.	June 20-24, 1952	45	7 (.16)	2 (.04)	7 (.20)	430 (9.6)	6 pr. (.53)+200 on sea	450 (15.)	—	4 (.09)	4 ♂♂,
Sachs Har. and Kellett R. valley	Sept. 15-18, 1952	12	—	—	—	—	25 (on harbour)	—	—	—	
Sachs Har. to 4 m. west on coast	May 12-14, 1953	10	—	—	—	—	—	—	—	—	6 (1.8)
Between Sachs Har. and C. Kellett	May 19-21, 1953	14*	—	—	—	—	—	—	3 (.2)	3 (.2)	4 (1.)
Sachs Har. to 4 m. west on coast	May 27, 1953	6*	—	—	—	—	—	—	2	—	5
Between Sachs Har. and Mary Sachs	May 29, 1953	7	—	—	—	—	—	—	4 (.57)	—	3 pr.+4
Between Sachs Har. and mouth of Sachs R.	June 15, 20, 21, 1953	15*	3 (.43)	4 (.5)	3 (.19)	25	6 (1.5)	109 (9.5)	1	—	1
Between Sachs Har. and Kellett R.	July 13, 18, 1953	14*	—	4 (.3)	2 (.14)	50 (3.6)	—	14 (1.5)	—	—	1
Between Sachs Har. and Mary Sachs	July 15, 1953	7*	2 (.3)	6 (1.1)	7 (1.0)	—	—	2	1	1	
C. Kellett region	Aug. 1, 1952	5	—	—	—	—	—	—	—	—	
C. Kellett region	Sept. 20-21, 1952	6	—	—	—	—	—	—	—	—	20 (10.)
C. Kellett region	May 15-28, May 30–June 6, 1953	47½	8 (.39)[3]	—	—	1050 (51.) 1 ♂	—	550 (19.)	7 (.15)	5 (.11)	25 pr.+1
C. Kellett region	June 7-19, 1953	52½	4 (.08)	4 (.08)	6 (.15)	1480 (28.) 2 ♂♂, 6 ♀♀	31 (1.2)	862 (25.) 2 ♂♂	—	2 (.04) 1 ♂, 1 ♀	10 pr.+2
Between Sachs Har. and Egg R. (dog team)	May 31, June 2, 1953	18*	—	—	—	200	—	—	4	1	
Egg R.	May 31–June 2, 1953	5*	—	—	—	20	—	—	1	—	4
Big R. to Kellett R.	July 2-3, 1953	16*	—	—	—	80 (5.)	8 (1.)	16 (1.5)	—	—	2 (.6)
Sachs Har. to north of Lennie R.	June 28–July 1, 1953	25	2 (.08)	—	4 (.20)	410 (16.)	25 (2.0)	130 (7.8)	—	—	3 pr.+6
North of Lennie R. to Wolley Pt.	July 2-5, 1953	28	1 (.04)	2 (.07)	3 (.14)	120 (4.3)	50 (3.6)	115 (6.2)	—	—	1 pr.+8
S. side Storkerson B.	Aug. 5, 1952	11½	3 (.26)	—	—	110 (9.6) 2 ♂♂	30 (5.2)	—	—	—	11 ad. (3.
Wolley Pt. to Bernard R.	July 6-9, 1953	25	28 (1.1)	3 (.12)	12 (.60)	530 (21.)	500 (40.)	220 (13.)	—	—	3 pr.+1.
10 m. north of Adam R.	Aug. 8-9, 1952	5	—	—	—	120 (24.)	—	—	—	—	
Bernard R. to Thomsen R.	July 9-17, 1953	60	4 (.07)	6 (.10)	7 (.15)	52 (.87)	42 (1.4)	196 (4.9)	6 (.10)	—	16 ♂♂ (
Antler Cove region	Aug. 13-16, 1952	10	—	—	2 (.25)	30 (3.)	20 (daily on sea)	—	—	—	
Between Castel and Mercy bays	Aug. 20-28, 1952	60	3 (.05)	—	5 (.10)	—	265 (on sea) 1 ♂	—	—	—	
Between Castel and Mercy bays	July 20–Aug. 8, 1953	36	4 (.11)	—	7 (.24) 1 ♂	—	195 (on sea)	150 (on sea)	15 (.42) 2 ♂♂, 1 ♀, 1 downy	—	
Gyrfalcon Bluff and Back Pt. regions	Aug. 11-20, 1953	36½	4 (.11)	2 (.05)	—	—	—	—	1 (.03)	—	
Pim Ravine region	Aug. 24-27, 1953	13½	—	—	—	30 (1 flock)	—	—	—	2 (.15)	
15 m. south of Russell Pt.	Aug. 30-31, 1953	4	—	—	—	1, 1 juv. ♂	6 (3.0)	—	2 (.50)	—	

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*The 1952 records are the combined observations of Manning and Macpherson. Höhn's records are starred; the remaining 1953 records are those of Manning.

[1] *See* p. 6 for details.

[2] An occasional specimen taken near camp a day before or after the dates given in this table has been included. Höhn's specimens are not given here, since they were frequently taken on dates other than those of his timed walks; instead, they are mentioned in the text, usually with their weights. A very few other specimens taken at places not mentioned in the table are also referred to in the text, as are those of species not listed in the table.

[3] Chiefly migrants or birds flying over from floe.

[4] Mostly at colony on July 6.

[5] Plus 130 flying east in flocks.

[6] Probably a local concentration near coast.

[7] Frequently seen on sea near camp.

[8] Notes lost.

[9] On sea or around shore.

[10] In a restricted area.

TABLE II

The Numbers of Birds Counted or Estimated During Timed Walks with the Estimated per Square Mile Population[1] of the Regions Given in Brackets and the Number of Specimens Collected in Bold Type[2]

	Peregrine Falcon	Willow Ptarmigan	Rock Ptarmigan	Little Brown Crane	Semipalmated Plover	Golden Plover	Black-bellied Plover	Turnstone	Pectoral Sandpiper	White-rumped Sandpiper	Baird's Sandpiper	Semipalmated Sandpiper	Buff-breasted Sandpiper	Sanderli
	2 (.08)	**1 ♂, 1 ♀+6 downy**	3 (.62) **3 ♀♀**	—	—	10 (1.7)	10 (1.7)	—	—	—	—	15 (5.0)	—	—
	—	25 (1.6) **1 ♂, 1 ♀**	28 (1.8)	—	—	—	—	—	—	—	—	—	—	—
	1 (.01)	14 (.40) **3 ♂♂, 1 ♀**	81 (2.3) **5 ♂♂, 9 ♀♀**	2 (.01)	13 (.64) **1 ♀**	149 (3.7) **5 ♂♂, 4 ♀♀**	37 (.79) **2 ♂♂, 2 ♀♀**	3 (.11) **1 ♀**	—	—	3 (.28) **1 ♀**	38 (2.7) **3 ♂♂, 3 ♀♀**	5 (.40) **1 ♂**	3 (.54) **1 ♀**
	2 (.12)	1 ♂ (.30)	—	—	—	8 (1.9)	3 (.71)	—	—	—	—	8 (3.8) **2 ♀♀**	—	—
	—	8 (1.6)	—	2 pr. (.18)	—	—	—	—	—	—	—	—	—	—
	—	—	5 (3.3)	—	—	3 (2.0)	—	—	—	—	—	6 (8.0)	—	—
	—	—	—	—	—	2 (.38)	21 (4.0)	—	—	—	—	18 (6.9) **1 ♂**	—	—
	—	3 (3.0) **2 ♂♂, 1 ♀**	6 (6.0) **4 ♂♂, 2 ♀♀**	—	—	—	—	—	—	—	—	—	—	—
	—	—	2 (1.7)	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	1 pr. (.27)	—	—	—	—	—	—	—	—	—	1 (1.6)+1 downy **1**
	—	—	—	21 (.80)	14 (4.8)[6]	—	—	—	—	—	13 (5.9) **3 ♀♀**	—	—	—
	3 (.14) **1 ♂, 1 ♀**	—	—	14 pr.+3 (.94)	—	—	—	—	—	—	7 (2.5)	2 (.73)	—	—
	—	—	—	6 (.27)	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	2 (1.2)	—	—	—	—	—	—	—	—	—
	4 (.09)	4 ♂♂, 1 ♀ (.45)	1 (.11)	12 pr.+4 (.41)	12 (1.6)	4 (.36)	17 (1.5)	—	—	—	7 (1.2) **1 ♂**	12 (2.1)	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	6 (1.8) **1 ♂**	25 (7.5)	—	—	—	—	—	—	—	—	—	—	—
	3 (.2)	4 (1.)	3 (.6)	4	—	—	—	—	—	—	1	—	—	—
	—	5	1	6	—	1	—	—	1	—	—	—	10	—
	—	3 pr.+4 ♂♂, (4.0)	2 pr. (1.4)	36 (3.4)	—	25 (1 flock)	—	1 (.71)	—	—	6 (one flock)	—	25 (one flock) **1 ♀**	—
	—	1	—	5 (.14)	—	2 (.75)	4 (1.5)	—	—	—	—	—	—	—
	—	1	—	6 (.3)	3	6 (1.2)	8 (2.)	8	6	6	—	6	—	3
	1	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	5 (4.0)	—	—	—	—	—	—	7 (11.) **1 ♀**
	—	20 (10.)	800 (330.)	—	—	—	—	—	—	—	—	—	—	—
	5 (.11)	25 pr.+18 ♂♂ (4.5) **8 ♂♂, 7 ♀♀**	5 pr.+15 (sex?) (1.4) **1 ♀**	9 pr.+5 (.32) **1 ♂, 2 ♀♀**	—	2 (.30)	42 (5.1)	6 (1.3) **1 ♀**	156 (in flocks) **4 ♂♂, 1 ♀**	24 (7.8) **2 ♂♂, 1 ♀**	60 (migrant flocks) **1 ♂**	20 (5.9) **1 ♂**	9 (2.7) **1 ♂, 1 ♀**	675 (170.) **6 ♂♂, 1**
	2 (.04) **1 ♂, 1 ♀**	10 pr.+27 ♂♂ (3.5) **4 ♂♂, 6 ♀♀**	1 pr.+6 ♂♂ (.67) **1 ♂, 1 ♀**	46 (.58)	2 (.23)	—	126 (8.4)	56 (5.3) **1 ♀**	8 pr.+6 (3.3) **1 ♂, 1 ♀**	82 (12.)	10 (1.5)	100 (15.)	—	178 (27.)
	1	—	4	2	1	—	1	12	—	—	—	—	—	—
	—	4	12 (10.)	4	—	20	20	10	4	3	—	10	2	8
	—	2 (.6)	3 (1.)	3 (.1)	1	6 (1.2)	10 (2.)	1	1	—	—	—	—	1
	—	3 pr.+6 ♂♂ (1.8)	14 ♂♂, 4 ♀♀ (2.8)	1 pr.+6 (.21)	1 (.24)	4 (.64)	35 (5.6)	17 (3.4)	2 pr. (1.3)	1 (.32)	—	2 (.64)	1 (.32)	8 (2.6)
	—	1 pr.+8 ♂♂ (1.6) **1 ♀**	3 pr. (.54) **2 ♀♀**	—	—	5 (.71)	1 (.14)	2 (.36)	—	1 (.29)	—	2 (.57)	—	5 (1.4)
	—	11 ad. (3.8)+20 juv.	—	—	—	—	35 (12.)	5 (2.2)	—	—	—	—	—	35 (24.)
	—	3 pr.+13 ♂♂ (3.2)	3 (.48)	—	—	4 (.64)	4 (.64)	45 (9.0)	—	—	1 (.32)	—	—	7 (2.2)
	—	—	—	—	—	—	—	8 (8.0)	—	—	—	—	4 (one flock) **1 ♀**	55 (88.)
	—	16 ♂♂ (1.3)	30 (2.0) **3 ♂♂, 3 ♀♀**	16 pr.+4 (.40)	—	13 (.87)	45 (3.0)	53 (4.4)	13 (1.7)	4 (.53)	12 (1.6)	7 (.93)	1 (.13)	1 (.13)
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	4 (.27) **2 ♂♂, 2 ♀♀**	11 (.12)	—	—	1? (.07)	—	—	1 (.13)	1 (.13)	4 (.53)	—	10 (1.3)
	—	—	4 (.45)	11 (.20)	—	—	—	—	—	—	22+2 juv. (5.3)	—	—	—
y	—	—	2 (.22) **1 ♂**	5 (.09)	3 (.49)	—	—	—	1?	135 (10 flocks)	—	5 (1.1)	—	12 (2.6)
	2 (.15)	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	20 (12.) **1 ♂, 1 ♀?**	—	—	—	—	—	—	—	—	—	—	—

andpiper	Buff-breasted Sandpiper	Sanderling	Red Phalarope	Pomarine Jaeger	Parasitic Jaeger	Long-tailed Jaeger	Glaucous Gull	Sabine's Gull	Arctic Tern	Snowy Owl	Horned Lark	Raven	Pipit	Lapland L
	—	—	—	—	—	2 (.17)	6 (.25)	—	2 (.17)	2 (.08)	6 (2.0)	—	5 (2.1) **1 ♂**	30 (12.)
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
, **3 ♀♀**	5 (.40) **1 ♂**	3 (.54) **1 ♀**	—	7 (.23)+9 near tent **1 ♂, 4 ♀♀**	31 (.82) **1 ♂**	35 (.57) **3 ♂♂, 1 ♀**	79 (.55) **2 ♂♂, 2 ♀♀**	8 (1.3) **1 ♂, 1 ♀**	3 (.50)	7 (.08)	141 (7.9) **13 ♂♂, 9 ♀♀**	5 (.03)	—	490 (34.) **19 ♂**
	—	—	1 (.35)	15 (one flock)	7 (one flock)	50 (5.0) 30 being in one flock	8 (.47)	—	—	1 (.06)	5 (2.3) **1 ♀**	—	—	80 (47.)
	—	—	—	—	—	—	2 (.13)	—	—	—	12 (12.)^{10}	1 (.07)	—	—
	—	—	—	—	5 (1.7)	3 (1.0)	2 (.33)	—	2 (.67)	1 (.17)	6 (8.0)	—	—	18 (30.)
	—	—	—	—	6 (.58)	13 (1.2) **1 ♂**	34 (1.6) **4 ♂♂, 1 ♀**	3 (.29) **1 ♂**	—	—	7 (2.7) **1 ♂**	—	—	68 (40.) **1 juv.**
	—	—	—	—	—	—	—	—	—	—	30 (80.)^{10} **2 ♂♂**	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	1 (1.6)+1 downy **1 ♂, 1 downy**	—	—	—	—	4 (.80)	—	—	—	4 (6.4)	—	—	8 (16.)
	—	—	—	—	—	—	20 (1.1)	—	—	2 (.11)	3 (1.4)+2 juv. **2 ♂♂, 3 ♀♀**	2 (.11)	—	41 (23.)
	—	—	—	—	—	42 (3.8)	7 (.32)	—	—	—	8 (2.9)	2 (.09)	—	135 (61.)
	—	—	—	—	—	—	—	—	—	5 (.33)	1 (.53)	—	—	10 (6.7)
	—	—	—	—	—	—	4 (.40)	—	—	—	—	—	—	25 (25.)
	—	—	—	—	4 (1.8)	70 (3.1)	58 (1.3)	4 (.18)	4 (.16)	5 (.11)	42 (7.5) **2 ♂♂, 2 ♀♀**	1 (.02)	—	130 (29.)
	—	—	—	—	—	—	—	—	—	—	30 (20.)	3 (.25)	—	—
	—	—	—	—	—	—	—	—	—	—	—	2 (.2)	—	—
	—	—	—	—	—	—	3	—	—	2 (1.4)	30	4	—	3
	10	—	—	—	—	—	—	—	—	2	—	—	—	6
	25 (one flock) **1 ♀**	—	—	—	—	—	7 (1.0)	—	—	—	300 (340.)^{10}	—	—	700 (1000.)^{10}
	—	—	—	5	—	10	2	8	8	—	12	—	—	30
	—	3	14 (6.)	10 (2.1)	—	8 (1.8)	3 (0.2)	30 (4.2)	8	3 (.21)	—	—	—	30 (20.)
	—	—	—	1	—	1	1	12	8	—	6	—	—	6
	—	7 (11.) **1 ♀**	—	—	—	—	—	—	—	—	—	—	—	16 (32.)
	—	—	—	—	—	—	30^{9}	—	—	—	—	—	—	—
	9 (2.7) **1 ♂, 1 ♀**	675 (170.) **6 ♂♂, 1 ♀**	6 (2.1)	?^{8} **1 ♂**	—	8 (.91)	24 (.51)	10 (.98)	2 (.20)	7 (.18)	94 (16.) **11 ♂♂, 5 ♀♀**	5 (.11)	—	500 (130.) **4 ♂♂**
	—	178 (27.)	96 (11.) **1 ♂, 1 ♀**	?^{8}	—	117 (4.5)	53 (1.0)	270 (10.) **2 ♂♂, 1 ♀**	31 (1.2) **2♂♂**	6 (.11)	10 (1.5) **2 ♂♂, 1 ♀**	1 (.02)	3 (.63) **1 ♀**	470 (90.)
	—	—	—	—	—	—	—	—	—	1	—	—	—	—
	2	8	—	10	—	4	4	—	—	—	—	—	—	6
	—	1	3 (1.2)	6 (1.2)	—	6 (1.2)	3 (0.2)	7 (1.)	—	4 (.25)	3 (1.6)	—	—	25 (1.5)
	1 (.32)	8 (2.6)	21 (5.0)	55 (4.4)	—	45 (3.6)	14 (.56)	22 (1.8)	7 (.56)	7 (.28)	8 (2.6)	—	—	85 (34.)
	—	5 (1.4)	14 (3.0)	24 (1.7)	—	30 (2.1)	30 (1.1)	57 (4.1)	40 (2.9)	6 (.21)	6 (1.7)	—	—	36 (13.)
	—	35 (24.)	—	—	4 (.70)	1 (.17)	55 (4.8)	32 (5.6)	10 (1.7)	1 (.09)	—	—	—	15 (13.)
	—	7 (2.2)	15 (3.6)	40 (3.2)	1 (.08)	16 (1.3)	22 (.88)	77 (6.2)	75 (6.0)	1 (.04)	10 (3.2)	—	—	65 (26.)
	4 (one flock) **1 ♀**	55 (88.)	—	—	—	—	—	—	—	1 (.20)	—	—	—	8 (16.)
	1 (.13)	1 (.13)	18 (1.8)	9 (.30)	9 (.30)	156 (5.2)	29 (.48)	47 (1.6)	—	4 (.07) **2 nestlings**	17 (2.3)	—	—	165 (28.)
	—	—	5 to 10^{7}	—	—	—	8 (.80)	—	—	2 (.20)	14 (11.) **2 ♂♂, 1 ♀**	—	4 (4.0) **1 ♂**	30 (30.) **1 ♀**
	—	10 (1.3)	5 to 6^{7}	—	—	—	27 (.45)	—	—	5 (.08)	6 (.80)	—	1 (.17)	25 (4.2) **2 ♂**
	—	—	5 (on sea)	3 (.17)	—	118 (6.6)	35 (1.0) **1 ♂**	—	8 (.44)	33 (.92)	144 (32.) **1 ♂, 4 juv.**	1 (.03)	51 (14.)	95 (25.) **1 ♂, 1 ♀**
	—	12 (2.6)	29 (on sea)	2 (.11)	—	42 (2.3)	19 (.52)	—	—	40 (1.1)+9 juv. **1 juv. ♀**	8 (1.8) **1 ♂**	1 (.03)	1 (.27)	146 (41.)
	—	—	10	1 (coast)	—	—	—	—	—	—	—	1 (.07)	—	—
	—	—	—	1 (.50)	—	15 (7.5)	5 (1.2)	2 (1.0)+1 juv. **1♂, 1♂**	—	—	—	—	—	—

Gull	Sabine's Gull	Arctic Tern	Snowy Owl	Horned Lark	Raven	Pipit	Lapland Longspur	Snow Bunting
	—	2 (.17)	2 (.08)	6 (2.0)	—	5 (2.1) 1 ♂	30 (12.)	4 (1.7)
	—	—	—	—	—	—	—	11 (3.5)
♂, 2 ♀♀	8 (1.3) 1 ♂, 1 ♀	3 (.50)	7 (.08)	141 (7.9) 13 ♂♂, 9 ♀♀	5 (.03)	—	490 (34.) 19 ♂♂, 11 ♀♀	5 (.35)
	—	—	1 (.06)	5 (2.3) 1 ♀	—	—	80 (47.)	—
	—	—	—	12 (12.)[10]	1 (.07)	—	—	19 (13.)
	—	2 (.67)	1 (.17)	6 (8.0)	—	—	18 (30.)	1 (1.7)
♂, 1 ♀	3 (.29) 1 ♂	—	—	7 (2.7) 1 ♂	—	—	68 (40.) 1 juv. ♀	—
	—	—	—	30 (80.)[10] 2 ♂♂	—	—	—	—
	—	—	—	—	—	—	—	—
	—	—	—	4 (6.4)	—	—	8 (16.)	—
	—	—	2 (.11)	3 (1.4)+2 juv. 2 ♂♂, 3 ♀♀	2 (.11)	—	41 (23.)	2 (1.1)
	—	—	—	8 (2.9)	2 (.09)	—	135 (61.)	2 (.91)
	—	—	5 (.33)	1 (.53)	—	—	10 (6.7)	—
	—	—	—	—	—	—	25 (25.)	—
	4 (.18)	4 (.16)	5 (.11)	42 (7.5) 2 ♂♂, 2 ♀♀	1 (.02)	—	130 (29.)	—
	—	—	—	30 (20.)	3 (.25)	—	—	—
	—	—	—	—	2 (.2)	—	—	40 (40.)
	—	—	2 (1.4)	30	4	—	3	—
	—	—	2	—	—	—	6	—
	—	—	—	300 (340.)[10]	—	—	700 (1000.)[10]	10 (14.)
	8	8	—	12	—	—	30	—
	30 (4.2)	8	3 (.21)	—	—	—	30 (20.)	—
	12	8	—	6	—	—	6	—
	—	—	—	—	—	—	16 (32.)	—
	—	—	—	—	—	—	—	—
	10 (.98)	2 (.20)	7 (.18)	94 (16.) 11 ♂♂, 5 ♀♀	5 (.11)	—	500 (130.) 4 ♂♂, 4 ♀♀	550 (120.) 17 ♂♂, 12 ♀♀
	270 (10.) 2 ♂♂, 1 ♀	31 (1.2) 2♂♂	6 (.11)	10 (1.5) 2 ♂♂, 1 ♀	1 (.02)	3 (.63) 1 ♀	470 (90.)	3 (.57)
	—	—	1	—	—	—	—	—
	—	—	—	—	—	—	6	—
	7 (1.)	—	4 (.25)	3 (1.6)	—	—	25 (1.5)	—
	22 (1.8)	7 (.56)	7 (.28)	8 (2.6)	—	—	85 (34.)	—
	57 (4.1)	40 (2.9)	6 (.21)	6 (1.7)	—	—	36 (13.)	—
	32 (5.6)	10 (1.7)	1 (.09)	—	—	—	15 (13.)	—
	77 (6.2)	75 (6.0)	1 (.04)	10 (3.2)	—	—	65 (26.)	—
—	—	—	1 (.20)	—	—	—	8 (16.)	—
	47 (1.6)	—	4 (.07) 2 nestlings	17 (2.3)	—	—	165 (28.)	—
	—	—	2 (.20)	14 (11.) 2 ♂♂, 1 ♀	—	4 (4.0) 1 ♂	30 (30.) 1 ♀	20 (20.)
	—	—	5 (.08)	6 (.80)	—	1 (.17)	25 (4.2) 2 ♂	26 (4.3) 1 ♀?
♂	—	8 (.44)	33 (.92)	144 (32.) 1 ♂, 4 juv.	1 (.03)	51 (14.)	95 (25.) 1 ♂, 1 ♀	104 (29.)
	—	—	40 (1.1)+9 juv. 1 juv. ♀	8 (1.8) 1 ♂	1 (.03)	1 (.27)	146 (41.)	134 (37.)
—	—	—	—	—	1 (.07)	—	—	15 (11.)
	2 (1.0)+1 juv. 1♂, 1♂	—	—	—	—	—	—	8 (20.)